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LANDSCAPE MANAGEMENT

Turf Disease Control Guide

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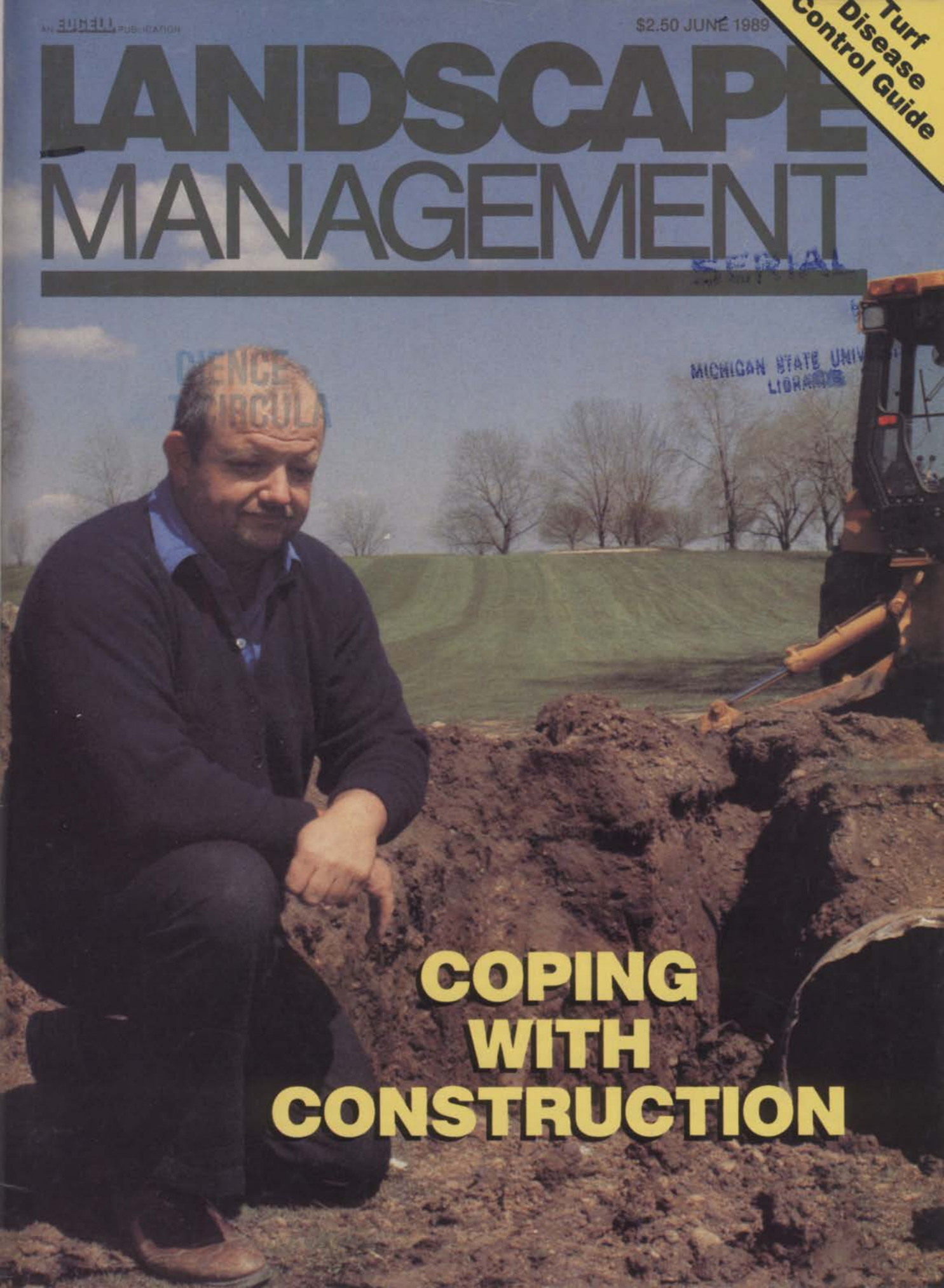

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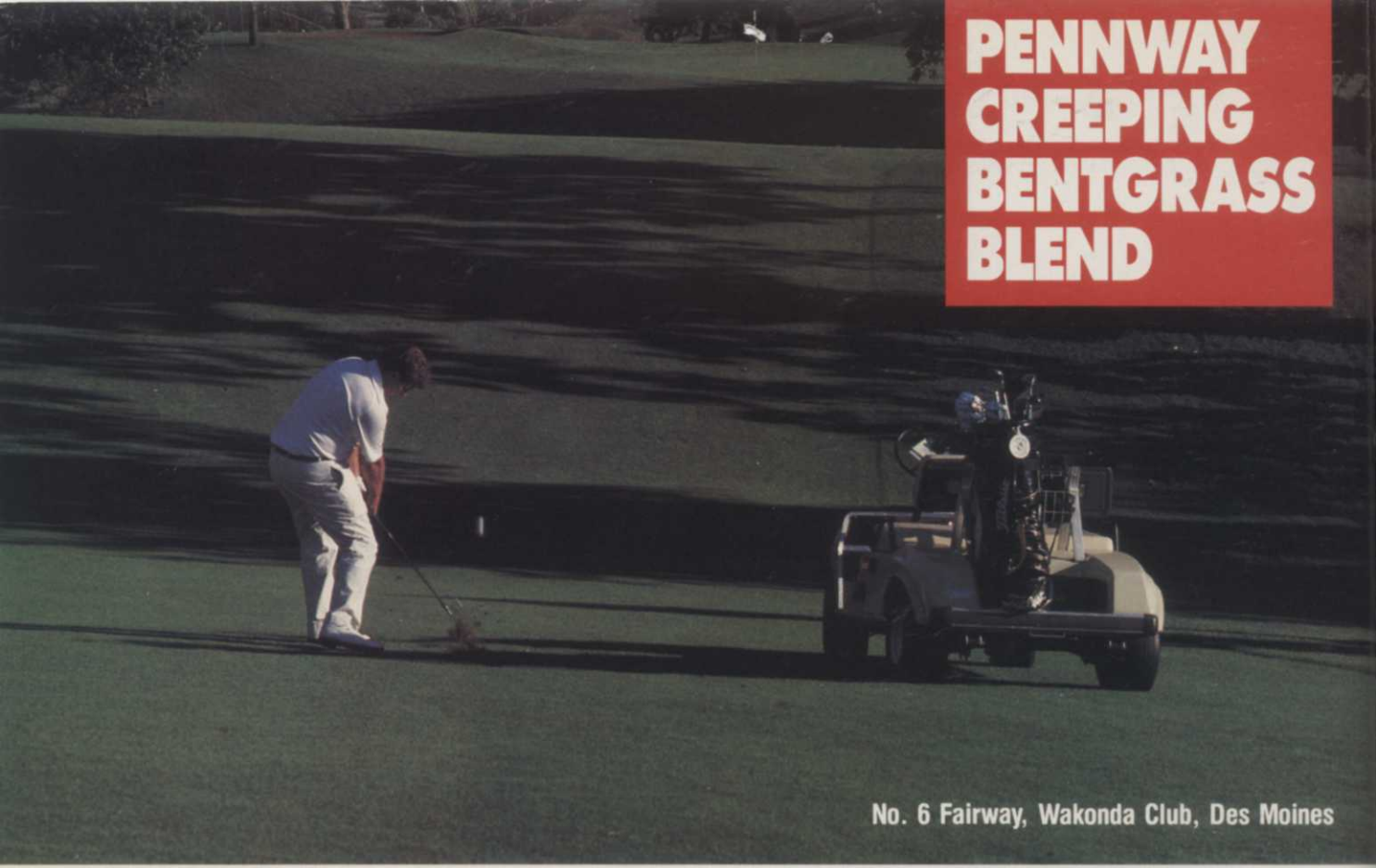

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JUNE 1989, VOLUME 29, NUMBER 6

LANDSCAPE MANAGEMENT

On the cover:
Rick Boehm of Wright-Patterson Golf Club, *by Will Perry.*

28 **COVER STORY: COPING WITH CONSTRUCTION...**
by Jerry Roche, editor. Rick Boehm has to work his golf course around military-type construction, a never-ending battle. He has found these problems a real challenge for 16 years.

36 **TURF DISEASE CONTROL GUIDE**
by Don Blasingame, Ph.D. and Bill Shane, Ph.D. How to knock out those dreaded diseases through use of fungicides, fertilization, appropriate cultural practices and new tools and ideas.
40 Warm-season guide
48 Cool-season guide

60 **A STRONGER SOD**
by J.R. Hall III, Ph.D. The cornerstone of quality sod is its shear strength, which comes about only after strict turfgrass management principles are implemented

66 **EMPLOYEE RETENTION**
by Ed Wandtke, CPA. As employee pools dwindle, flexible work schedules might be a way to attract and keep good people.

LANDSCAPE *Guide* MANAGEMENT

SEED POCKET GUIDE

Look for a special, pocket-sized supplement in this issue for those of you who are planning on planting turfseed this summer and fall. This guide offers the results of the National Turfgrass Evaluation Program, plus other valuable seed-use charts.

DEPARTMENTS

4 As I See It . . .
8 Green Industry News
11 Short Cuts
34 Project profile
68 Products
80 Research update
82 Jobtalk
86 Classified
90 Ad index
92 Problem management

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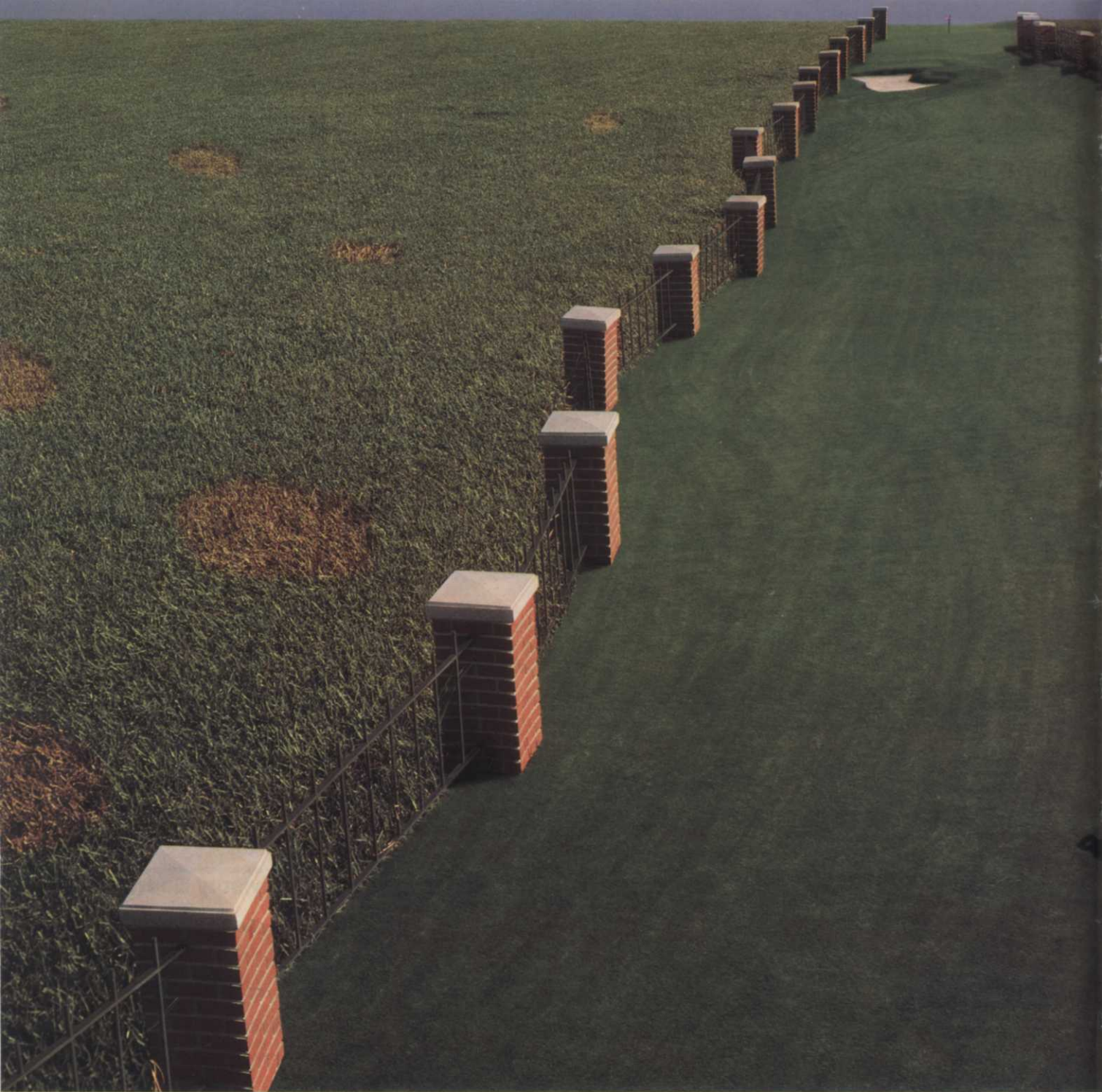

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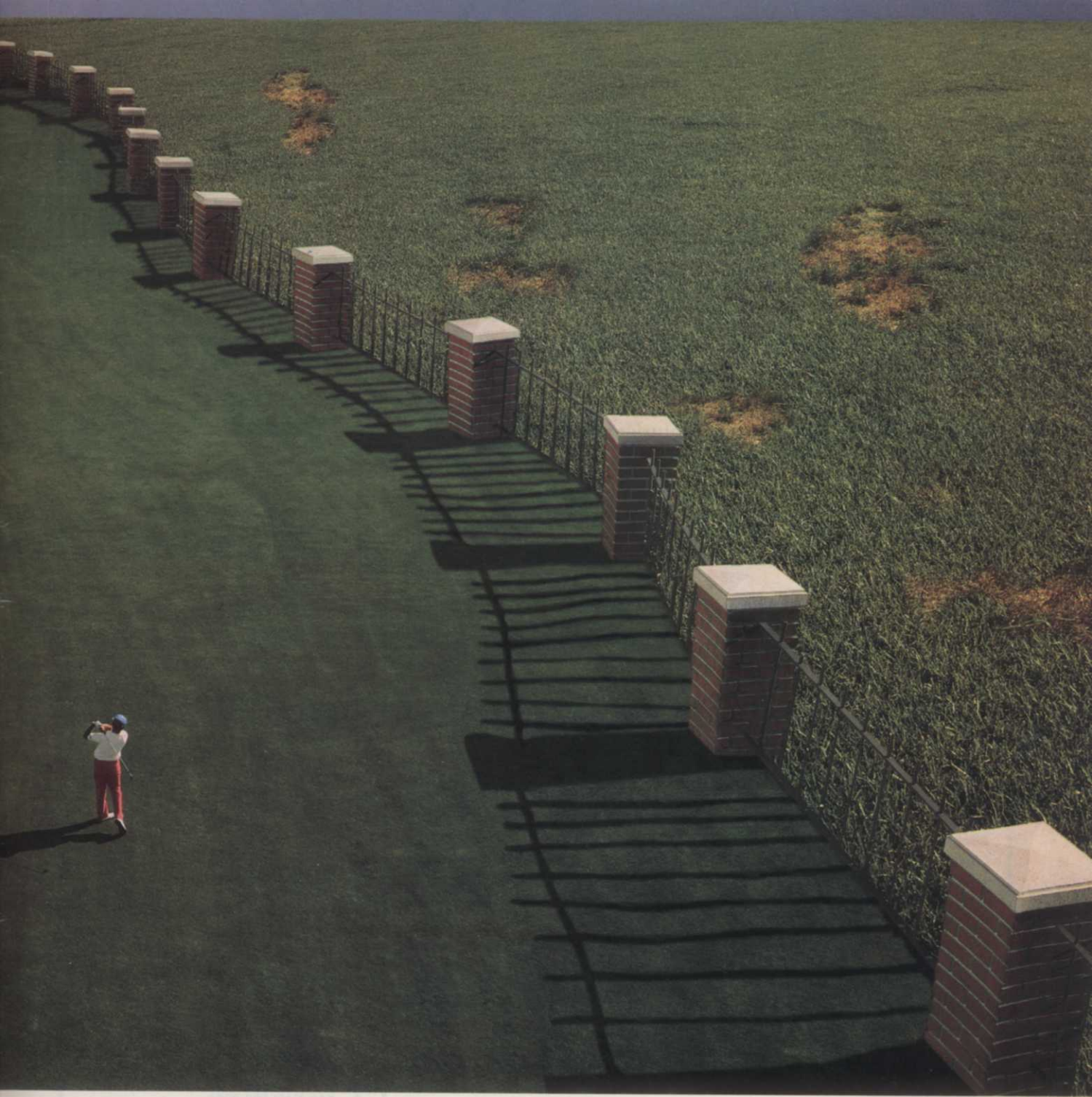

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A nation of innocents

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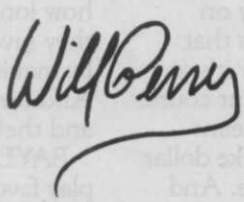
We will recover in this battle. And when we do, we'd be wise to not return blows. Keep in mind that the fighter in the other corner is not a bloodthirsty thug seeking our kayo. (That type is in fact a small minority, well-practiced in the art of media manipulation.) Mostly, the fighter across the ring is made up of people who want their children to enjoy long, healthy lives. Parents who sit up at night worrying about how to protect them from crack, war, and the Ted Bundys that may still be out there. It is people forced to come to terms with acid in rain and death in sex. They've seen astronauts incinerated in the Florida sky and the last remnants of the America's frontier choked by millions of gallons of muck.

Let's not give them reason to worry about seemingly innocent things like their lawn and apple juice. And if they do, let's not respond with a fist, but extend a hand of understanding.



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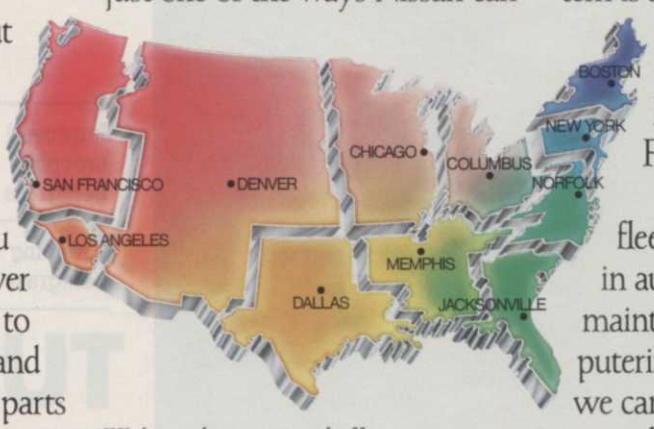

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GREEN INDUSTRY NEWS

JUNE 1989, VOLUME 32, NUMBER 6

LANDSCAPE MANAGEMENT

LAWN CARE

Organization formed to address industry concerns

WASHINGTON —More than 30 members of the recently-formed Council for Lawn Care Information (CLCI) met here early last month with officials of the Environmental Protection Agency (EPA).

Significant points that came out at the meeting:

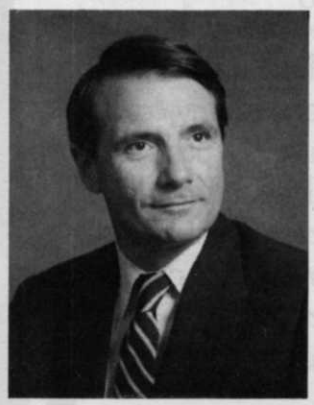
● Can the EPA's new directives include serious attempts to "de-mystify" the agency's workings and communicate better?

● Is re-registration worth it? Because of the recently-initiated EPA re-registration process for pesticides, their manufacturers might feel it is not worth generating data for minor-use products that don't have profit potential. This might include many products presently registered for lawn use.

● Will LCOs be included in agricultural worker protection standards currently being promulgated? The lawn care industry would like input on these standards, and would also like distinctions between mixers, loaders and applicators.

● How about three levels of pesticide certification? Some products would be applied only by certified applicators, some would require an on-site supervisor and some would require that a supervisor be available within "a reasonable time."

● Is a movement afoot in the Maryland legislature to ban the use of granular insecticides—perhaps even all granular pesticides—because of avian exposure problems? According to some members, yes.



Wilkinson: a busy month for legislative matters

● Is the lawn care industry getting a bad rap on integrated pest management (IPM)? LCOs say that the industry has been in favor of it for years. However, the consumer demands "picture-perfect" lawns that can only come with the use of pesticides. IPM is a methodology within the arsenal to control urban pests, but not the whole answer.

Dr. James F. Wilkinson, director of environmental and regulatory affairs for the Professional Lawn Care Association of America (PLCAA), headed up the meeting. Present were LCOs; university researchers; pesticide manufacturers, formulators and distributors; and members of the trade press, including LANDSCAPE MANAGEMENT group vice-president Bob Earley.

The organization's main objectives were established. They are:

1. Provide and share information about lawn care issues within the industry.

2. Establish positions and policies for lawn care issues.

3. Establish safety standards for the professional lawn care industry.

4. Give direction to PLCAA so it can proactively address issues such as posting, pre-notification, contracts, local jurisdiction, regulation authority, re-entry, watering-in, safety, etc.

The CLCI was formed by the PLCAA to advise and help establish standards and policies. □

ASSOCIATIONS

PLCAA responds swiftly to its critics

MARIETTA, Ga. — The Professional Lawn Care Association of America (PLCAA) wasted no time recently in rebutting a report which blasted lawn care pesticides.

In its newly-published report, "Keep Off the Grass," the consumer watchdog group Public Citizen singled out as dangerous 40 different pesticides used by the industry, and implicated 12 as carcinogenic. The report was given coverage in the April 18 issue of *USA Today*.

Dr. James F. Wilkinson, the PLCAA's director of regulatory and environmental affairs, requested and was granted equal time to respond in the paper's April 20 issue. Subsequent media appearances by both groups were broadcast by the CNN-TV news network, numerous local television and radio stations and newspapers.

"Public Citizen chose not to use scientific or medical experts in its report," said Wilkinson. "The truth is that the Environmental Protection Agency has been reviewing the chemicals for years, and a 1987 report by the American Council on Science and Health, written by independent scientific and medical experts, concluded that lawn care chemicals, when used as directed, pose no known hazard to human health."

Public Citizen plans to continue its attack, rallying for stricter state regulations and limited use of chemicals by homeowners. "Ultimately, the best way to protect ourselves from the dangers of pesticides is not to use them," said "Keep Off the Grass" author Laura Weiss.

PLCAA has advised its members to direct all media inquiries about the report to the association at (404) 977-5222. □

RESEARCH

Managing turfgrass under tree shade

RALEIGH, N.C. — Environmental conditions in shaded areas make growing turf a very difficult task. Still, there are things you can do to make the best of the situation.

The problems associated with tree shade, according to Dr. Art Bruneau, is that the canopy often blocks enough light to make photosynthesis impossible. In addition, shade conditions are conducive to disease development, and tree and shrub roots compete with the turf for moisture.

Bruneau is an extension turf pathologist at North Carolina State University.

"These conditions produce succulent, weak turfgrass plants that are slow to establish, susceptible to environmental stress, and unable to withstand traffic compared to plants grown in full sunlight," says Dr. Bruneau.

He suggests selectively removing trees whenever possible, in areas that get less than 50 percent open sunlight, or less than four hours of sunlight per day. "Removing lower limbs of existing trees and unnecessary undergrowth will greatly enhance wind movement and reduce the potential of disease infection," he adds.

Dr. Art Bruneau

Select trees with dense canopies and/or shallow root systems such as willows, poplars, ashes and certain maples. Also, Dr. Bruneau adds, use shade-

continued on page 12

AWARDS

Florida man wins Lawnman award

ORLANDO, Fla. — Roger Brown of Brown Lawn Development, Ormond Beach, Fla., "mowed down" 48 other contestants to win the first American Landscape Maintenance Association (ALMA) Lawnman Competition.

The contest took place April 1 at ALMA '89 Lawn Equipment Exposition here. Each contestant had to mow and trim a 25-foot wide obstacle course that included 20 feet of sidewalk, 12 feet of chain link fence and 20 feet of mulched bed.

Brown's winning time of 2 minutes, 47.94 seconds was well ahead of the average time of 3 minutes, 30 seconds. His efforts earned him a four-foot trophy and a new Snapper line trimmer. □

Roger Brown

SHORT CUTS

MOSS CONTROL... Although there are no guaranteed chemical methods for moss control, **Dr. Norm Hummel, Jr.** says the best method is to apply iron sulfate or ferrous ammonium sulfate at one pound per 1,000 square feet. Wait one hour and water in, or after the moss turns black. Apply in cool, humid weather. Rake the moss out after it dies, and follow with an application of lawn fertilizer to encourage growth of desirable grasses. If large bare spots remain, it may be necessary to seed or sod.

BIGGER AND BETTER...Jim Carnes, most recently president of International Seeds of Halsey, Ore., is becoming head of North American affairs for Cebeco, the giant Dutch company which owns both International Seeds and the European seed company Van Engelen Zeden. The move takes effect July 1. Word is that **Rich Underwood** will succeed Carnes.

HOW FAST IS FAST?... Recommended Stimpmeter speed of greens should not exceed nine feet, according to the USGA's **Jim Snow**. Writing in the Long Island GCSA newsletter, Snow said that more than nine feet "is an unreasonable range at all times." He also noted, "maintaining speeds between 7'6" and 9' should be feasible. Speeds greater than 9' should be established only for special occasions. Trying to keep green speeds above 9' at all times, as desired by some golfers, often results in serious problems and should be avoided."

HAPPY BIRTHDAY TO... The Texas Agricultural Extension Service is 75 years old. The big day was May 8, and this month the Lone Star State joins with other states in special birthday observances. County extension agents, members of extension program councils, mayors and other local state and national leaders are participating in the festivities.

DROUGHT? WHAT DROUGHT?... It turns out we've gotten all excited over nothing. According to **John Ford** of the Pesticide Applicators' Professional Association, a drought is technically defined as two consecutive years of less than 50 percent rainfall. That's a relief.

BACK TO GRASS... Ohio State University is the most recent major school to change its varsity football field from synthetic turf back to natural grass. The Buckeyes had played on plastic since 1970. O.S.U. thus becomes the third Big Ten school to have natural grass, joining Purdue and Iowa.

tolerant grasses. Mixtures of turf-type tall fescue and shade-tolerant cultivars of Kentucky bluegrass (80:20 by weight) are the best choices where cool-season turf is concerned.

Mow shaded grass at its top recommended mowing height (tall fescue mixtures at four inches) and fertilize at the same rate as you would for turf in full sun.

Weed problems are likely to include moss, which can be controlled with copper or ferrous sulfate sprayed at 5 oz. per 1,000 sq. ft. in four gallons of water. An application of 5 to 10 lbs. of ground limestone per 1,000 sq./ft. prior to reseeding will help to inactivate the corner sulfate that may be toxic to seedlings, adds Dr. Bruneau.

Because goosegrass and crabgrass need high light intensity to germinate, the use of pre-emergence herbicides in shaded areas is unnecessary, he concludes. □

MAINTENANCE

Institute brings IPM to suburbs

GAINESVILLE, Fla. — Experts at the University of Florida's Institute of Food and Agricultural Sciences (IFAS) are promoting integrated pest management (IPM) in suburban settings.

The IPM approach is based on understanding what factors cause pest populations to get too high and how those factors interact. Pesticides can then be applied, for example, at a time of day during which they would not kill off the pest's natural enemies.

"Changing your watering schedule or the length you cut the grass may reduce the number of pests, or keep them from coming back after spraying," says Dr. Dan Short, an IFAS entomologist.

He believes the institute extension service is a natural provider of IPM information, "because it is the most consulted source for home gardening information by homeowners and lawn care professionals."

The institute believes lawn care companies are amenable to IPM, based on a study by graduate student Wendel Martinkovic.

"We found a good level of knowledge and awareness," says Martinkovic. "Some of the professionals felt that lack of consumer knowledge sometimes keeps them using less than optimal practices."

Martinkovic's study found that two-thirds of the lawn care professionals did not think IPM would decrease profits or be too complicated. Forty percent said public awareness of safety and environmental issues had reached a level that would make urban landscape IPM a marketable commodity.

Short says the IPM message is being broadcast in extension service newsletters, appearances on local television and radio stations, and in speeches to various community groups. □

RESEARCH

Sandoz takes big biological steps

PALO ALTO, Calif.— New research facilities have widened the scope of Sandoz Crop Protection Corporation's research in agricultural biotechnology and biological insect control.

The California laboratories will be used to develop environmentally safe crop protection products derived from naturally-occurring strains of *Bacillus thuringiensis* (BT).

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Answers to the seven most asked questions about SUPERSORB.®

When we introduced SUPERSORB® water absorbants a few years ago we were confident that they would be successful, but we had no idea that this practical and versatile water management tool would generate so much enthusiasm among landscape professionals.

We,ve compiled some of the most frequently asked questions and answers. If your questions aren't answered here, give us a call toll-free at the number below.

Q: What is SUPERSORB and what does it do?

A: SUPERSORB is a water absorbant. It consists of acrylic copolymer crystals which absorb water to increase the moisture holding capacity of soil. SUPERSORB crystals can absorb up to 200 times their weight in water and release nearly 100 percent of their reserves as the soil dries out or plants require it. SUPERSORB keeps on working for at least two years. It is non-toxic to plants, people and animals, and is eventually metabolized by soil microorganisms.

Q: What will SUPERSORB do for me in landscape installation and maintenance?

A: SUPERSORB C lets you and your customers extend the time between waterings. It helps trees, shrubs, bedding and container plants and ground covers survive moisture stress conditions. SUPERSORB F can be used as a rootdip for bareroot plants, added to hydroseeding mixtures or used to speed the establishment of sod. So SUPERSORB saves you time and water and gives you better plant establishment.

Q: What's the difference between SUPERSORB and other water absorbants on the market?

A: Aside from SUPERSORB's unique blue color, which is helpful when mixing it into the soil, you'll find that SUPERSORB's particle size is more uniform for more predictable performance. In addition, SUPERSORB is backed by AQUATROLS' customer service and 35 years of experience.

Q: Which particle size, Coarse or Fine should I use?

A: We recommend SUPERSORB C, Coarse Particle (1-2mm) for transplanting trees and shrubs, amending the soil in beds, containers and hanging baskets. SUPERSORB F, Fine Particle (<.5mm) is used for hydroseeding, installing sod, seeding and for root dipping bareroot stock.

Q: Will SUPERSORB waterlog the soil or take water away from plant roots?

A: No to both questions. SUPERSORB expands into discrete chunks; it doesn't form a soggy mass. As SUPERSORB expands and contracts it actually helps keep the soil or container mixes open and loose. Since water must be in a free state for SUPERSORB to absorb it, water clinging to soil particles or within plant root tissues cannot be absorbed by the crystals.

Q: How much does SUPERSORB cost to use?

A: It costs about $.50 to amend the backfill for a tree or shrub with a one foot in diameter rootball.

Q: Where can I buy SUPERSORB?

A: From the turf and hort supply distributors throughout North America. If your distributor doesn't stock SUPERSORB, accept no substitutes. Call us toll free and we'll give you the name of the nearest SUPERSORB distributor.

Call us for further information, technical service or a free sample. **1-800-257-7797, in N.J. (609) 665-1130.**

AQUATROLS

The Water Management People

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Triumph®

90% grub control in 2 to 3 days.

Triumph®. The newest liquid form of grub control for lawn care professionals is here, and now available through your Lebanon Total Turf Care representative.

Backed with over 10 years of major university and independent research, new Triumph insecticide provides fast, effective control of white grubs and surface feeding insects in home lawns.

Within two days of application, Triumph is hard at work, controlling grubs, sod webworms, armyworms and mole crickets. Insect problems are eliminated quickly and easily, before serious injury has occurred to your customer's turf and to your company's reputation.

Triumph can also be used as a preventative, to stop damage before it starts with an application from July to October.

For more information on how you can Triumph over insects and grubs, call our Greenline at 1-800-233-0628 or contact your local Lebanon representative today.

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TOTAL TURF CARE
A division of Lebanon Chemical Corporation
P.O. Box 180 • Lebanon, PA 17042

Triumph® is the registered trademark of CIBA-GEIGY. Always read and follow label directions. Triumph is a restricted use pesticide and is not for use on sandy soils. Not to be sold or used in New York. For retail sale to and use by certified applicators or persons under their direct supervision, and only for those uses covered by the certified applicator certification.

Circle No. 126 on Reader Inquiry Card

vice president of research.

"The research is directed at finding hormones that are present in very tiny amounts in the insects," says Sandmeier. "We isolate these neuropeptides from insects using sophisticated separation techniques and bioassays to identify the principles."

Although the United States is leading the world in biotechnological research, Sandoz Crop Protection president and CEO Dale Miller believes more domestic support is needed to maintain that lead.

"For it (biotechnology) to become the workhorse tool that can light a fire under American farm production," says Miller, "the government must get squarely behind the next stage of development, and push."

Miller

According to Miller, the United States is in danger of losing its leadership position in biotechnology due to governmental footdragging and a complicated bureaucracy. A strong supporter of product testing, Miller believes that "if laws and regulations were written with an eye to the potential economic advantage that biotechnology offers to American agriculture ...more effort would be made to streamline the system." □

RESEARCH

Ryegrass mixture yields top turf

RIVERSIDE, Calif. — A University of California overseeding trial combining perennial and intermediate ryegrasses has produced a better quality turf.

The field trial was conducted on a common Bermudagrass fairway at a local golf course. The trial tested annual ryegrass, Palmer perennial ryegrass, Agree intermediate ryegrass and a 50/50 mix of the perennial ryegrass and intermediate grass.

Each of the grasses and the ryegrass mix were established in late September on 50 sq. ft. plots and seeded at 100 to 600 lbs./acre rates.

Researchers concluded that:

- Annual ryegrass established quicker and was first to transition in spring;
- The initial stand of overseeding grass was directly dependent on the seeding rate, irrespective of species, with the higher seeding rates yielding a more quickly-acceptable grass stand;
- A seeding rate had little effect on the mature overseeding in terms of percentage of cover;
- A reasonable seeding rate, irrespective of species, was the 300 to 400 lbs./acre rate.

The study was conducted by John Van Dam, U.C. Cooperative Extension farm advisor, assisted by Victor Gibeault and Richard Autio. □

INDUSTRY

Dow and Lilly in joint venture

MIDLAND, Mich. — Dow Chemical Co. and Eli Lilly Co. are combining their worldwide agricultural chemical divisions to form one of the six largest agricultural-chemical concerns in the world.

The joint venture, to be called Dow Elanco Inc., will be formed by consolidating Dow's plant science business, Dow Agricultural Products, and its pest control business with Lilly's plant science business, Elanco Products Co. The joint venture is expected to reach sales of about $1.5 billion in its first year, according to Dow.

The new company plans to build a $35 million research facility in Indianapolis. It will be staffed by 2,800 employees, largely in marketing, sales and re-

BANOL®

Positive Prevention or sure cure for Pythium disease

Preventative control of Pythium blight and damping-off can save you from major turf loss to these destructive diseases. Just apply BANOL® fungicide every 7 to 21 days when conditions are favorable for disease development.

But if Pythium is already damaging your turf, cure it fast with BANOL. Applied at the higher rates, this highly-effective fungicide soon has Pythium under control.

BANOL is systemic, so it won't wash off like contact fungicides. And unlike many fungicides, BANOL shows no indication of resistance development. Further advantages: non-phytotoxic, non-leaching, compatibility with other fungicides and insecticides.

For complete information on nourishing and protecting your turf, join the NOR-AM Turf Management Program. Write to: Communications Department, NOR-AM Chemical Co., 3509 Silverside Road, P.O. Box 7495, Wilmington, Delaware 19803.

IMPORTANT: Please remember always to read and follow carefully all label directions when applying any chemical.

NOR-AM

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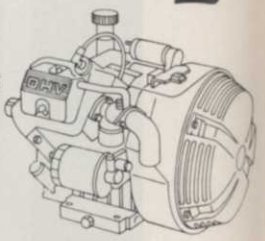
The new 2-seat AMT® 622 All Materials Transport will do everything our familiar 600 Transport will do.

With one exception. It'll take a passenger along.

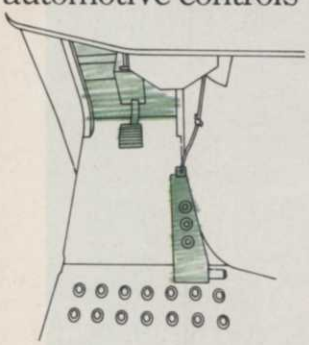
Its roomy seating and ease of boarding provide as much comfort as you'll find in a compact car.

Its well positioned automotive controls make it as easy to handle as one, too. With a responsive steering wheel, foot operated accelerator and brake, even halogen headlights to light the way.

But don't let all these creature features fool you. The AMT 622 hauler is built to be a hardworking beast.



The AMT 622 Transport gets its appetite for work from a powerful 10-hp engine.



Automotive-type steering wheel, brake and accelerator pedals provide ease of operation.

Manual tilt bed comes standard —hydraulics available as an option.

*On level ground

assenger boarding

Its 4-wheel drive lets you wade through mud, muck and mire. Yet its high-flotation design and differential axle allow you to turn tight without tracking up delicate turf.

Its towing power is impressive, too. An automatic variable speed transmission develops a 62 to 1 torque ratio. So you can tow up to 1000 pounds of trailer weight. Plus a 600 pound* payload. And a passenger to boot.

So whether you need a transport to go solo, or one built to bring a buddy along, come to John Deere for your seat selection.

Ask your dealer for all the facts on the growing line of all materials transports. Or write, John Deere, Dept. 84, Moline, IL 61265.

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Nothing Runs Like a Deere®

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Model JD9-CT SPRAY GUN with Gauge Port

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search. They will be supported by another 4,500 people in manufacturing who will remain on the payrolls of Dow and Lilly.

Popular industry products manufactured by the companies include Team, Rubigan, Balan, Surflan, Treflan and Sonar (Elanco), and Dursban and Turflon (Dow). □

CONFERENCES

Waitley to address ALCA

FALLS CHURCH, Virg. — Dana Waitley, Ph.D., who was nominated by the President's Council as Woman of the Year, will be the keynote speaker for the 1989 Green Team Conference and Trade Show.

Dr. Waitley is the daughter of noted author and speaker Dr. Denis Waitley. She graduated from the University of California San Diego and has a master's degree and a doctorate in psychology. She is a Phi Beta Kappa scholar, a Freedom Foundation Award nominee, served as goodwill ambassador to Mexico and was honored in the *U.S. Congressional Record* for an inspirational essay on America.

The show will be held Nov. 9-12 at the Sheraton St. Louis and Cervantes Convention Center in St. Louis. Sponsors of the three-day affair are the Associated Landscape Contractors of America (ALCA) and the Professional Grounds Management Society. For more information call (703) 241-4004 or (301) 667-1933. □

INDUSTRY

Nor-Am to buy ICI faciltiy

GOLDSBORO, N.C. — Nor-Am Chemical Co. announced it will purchase the ICI Agricultural Products Group Eastern Re-

Why play host to unwanted guests, when Lebanon has what it takes to keep pests off your turf?

Your lush green turf is plenty of good eating to all kinds of insects. Like grubs. Chinch bugs. Sod webworms. And billbugs.

That's why Lebanon features an outstanding choice of formulations with DURSBAN, straight or in fertilizer/chemical combinations. DURSBAN controls almost any kind of surface or soil-feeding insect, and keeps controlling weeks after you apply. It's also effective as a perimeter treatment around buildings and patios, to stop nuisance pests like ants, ticks, earwigs and fleas.

Feed and control in one easy move.

Save time and money with Lebanon combination fertilizers and DURSBAN. If you want the long-range benefits of a premium homogeneous fertilizer, use Country Club 19-4-6 With DURSBAN. Or if you prefer the controlled-feeding of an S.C.U. blend, choose Lebanon Pro 20-3-5 With DURSBAN.

For situations that require a straight chemical application, Lebanon offers a 2.32% DURSBAN formulation on a granular cob base.

For more information, contact your local Lebanon distributor or call our Greenline, today, at **1-800-233-0628.**

Send pests the message—the picnic is over with DURSBAN.

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Don't forget the DURSBAN* or pests will have a picnic.

search Center here.

The facility is located on about 265 acres of land and includes research laboratories, environmental testing sites, a large-scale formulation facility, greenhouses, office buildings and a research farm. It has been operated by ICI since 1972.

Dr. Derek Cornthwaite, president of ICI's Agricultural Products Group, said the facility is being sold "due to the reorganization of our research and development efforts in the United States." Terms of the sale were not disclosed. □

LEGISLATION

Irrigation plans need muny okay

SOUTHFIELD, Mich. — Some California municipalities have begun to require approval of sprinkler irrigation plans in a move to conserve more water in that over-populated, water depleted state.

"Our (California's) drought conditions have made everyone very concerned about water," says Dr. Kenneth H. Solomon.

Solomon is director of Cal State-Fresno's Center for Irrigation Technology.

Additionally, some cities are considering plant materials lists which they require contractors to follow to conserve water on new construction sites.

Solomon spoke to contractors at Century Rain Aid's Expo '89 conference. □

TREES

Arborists revise pruning guide

AMHERST, N.H. — The national Arborists Association is offering members copies of its revised Pruning Standards.

Available in tear-off pads of 50 individual standards, as well as book form, the standards include information on fine pruning, standard pruning, hazard pruning, crown reduction pruning and pruning terminology.

To order, contact the association at Route 101, P.O. Box 1094, Amherst, NH 03031-1094; (603) 673--3311. □

LANDSCAPING

Garden hosts ideal plants

RIVERSIDE, Cal. — Southern Californians have an opportunity to view a garden featuring water-conserving landscapes, thanks in part to the University of California Cooperative Extension (UCCE) here.

The garden includes areas of fire-retardant plants, California native plants, a microclimate/design demonstration (showing appropriate plantings for north, south, west and east sides of a home), home plantings for full, partial and no sun, an open ampitheatre for educational programs, resource patios for sheltering the garden plant materials and a maintenance yard. Also, 48 education stations have been established within the garden.

The garden's list of plant species includes more than 21 different groundcovers, 45 shrubs, 30 trees, four palms, three turfgrasses and three mulches.

The garden opens June 24 adjacent to the headquarters of the Western Municipal Water District, which donated the land, at 450 East Alessandro Blvd. □

BIOTECHNOLOGY

Nurseries ideal for biologicals

APOKA, Fla. — Growers of ornamentals and foliage plants shouldn't pass up the business opportunities in producing biological insect and weed controls, says Lance Osborne, a re-

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- Reduce handmowing up to 70%
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- Get the dependability and durability that is built into every National Mower.
- Pay less than 1/2 the price of a comparable riding rotary mower.

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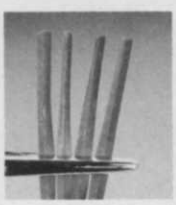

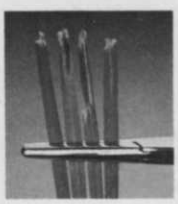

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Nothing else keeps y

our course this clean.

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searcher with the University of Florida's Institute of Food and Agriculture Science.

"The world's leading producers of biologicals started out in the nursery business, and now they're using their greenhouses to produce organisms for biological pest control," Osborne says. Nurseries are a natural starting point, both as producers and as consumers of new commercial biocontrol products, Osborne says, because nurseries need repeated doses of biocontrol organisms and exist in a closed environment. Many in the nursery industry also know how to create the controlled conditions necessary to produce biologicals, he adds, and they have the needed expertise in plants, bugs, weeds and plant pathogens.

"Of course, biocontrol organisms will have to be cleared with various agencies before they are released or sold," adds Osborne, "But there is every reason to be excited about the potential for biologicals for the nursery industry." □

ACADEMIA

VA Tech adds turf option

BLACKSBURG, Virg. — The two-year Agriculture Technology program at Virginia Tech, which graduated its first class last month, is adding a landscape and turf management option to its three existing options for students.

The program offers concentrated, two-year college level experience to individuals who wish to pursue careers in agriculture. It emphasizes the application of classroom instruction to actual situations found within the agriculture industry.

Chalmers

Students selecting the new option, which will begin this fall, will be trained in turfgrass and landscape installation, maintenance and management.

Interested students should know that "The existing demand in just the turf area, especially in golf course management and lawn care, is probably two to four job opportunities for every graduate," says David Chalmers, extension agronomist. □

PEOPLE

Thomas new LM/LCI rep

CLEVELAND — Barbara Thomas is the new eastern region sales manager for LANDSCAPE MANAGEMENT and LAWN CARE INDUSTRY magazines.

Thomas was previously an account executive with Ameritech Publishing, Inc.

Thomas

She says she looks forward to establishing ongoing professional relationships with advertisers, "rather than closing an account and not being in contact until the following year." □

Woods rearmount mowers...

The Finest Money Can Buy.

Accumulating wealth relies on two factors: 1) How good one is at making money, and 2) How good one is at spending it.

When it comes to investing in a lawn mower, there's no better value than a rugged, reliable Woods rearmount mower. That's because only Woods offers convenient easy-on, easy-off 3 point hook-up, industrial-type blade spindles, high velocity straight side discharge and three blades to help you get your mowing done faster and better.

Model RM 59 mows a 5 ft. swath (up to 2 acres per hour) and features a single V-belt drive with automatic adjustment.

Model RM 600 mows a 6 ft. swath (up to 3 acres per hour) and features a heavy-duty gearbox over a belt drive.

See your Woods dealer today for more information and complete specifications on rearmount mowers with cutting swaths ranging from 3-1/2 ft. to 7-1/2 ft. Or write for literature to Woods, Dept.LM, Oregon, Illinois 61061.

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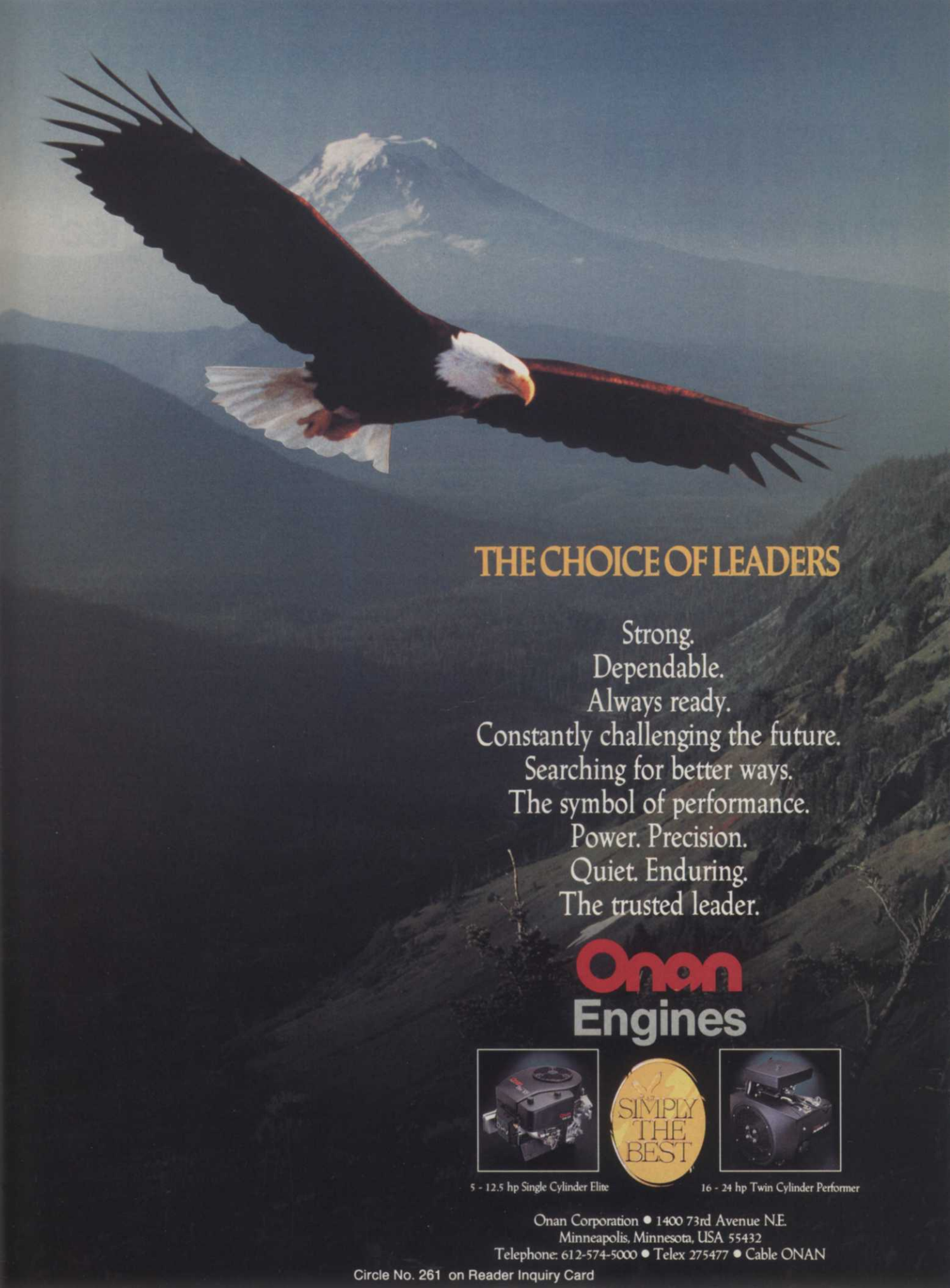


Circle No. 261 on Reader Inquiry Card

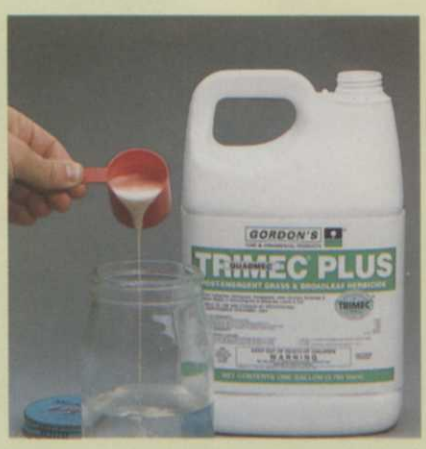
Now! Affordable post-emergent control of

Crabgrass & Nutsedge

plus the broadleaves you get with Trimec®

HERBICIDE

Thousands of your fellow turf-management pros tested Trimec® Plus Herbicide last year. Read how you can profit from their experiences with this new herbicide that is labeled for Kentucky bluegrass and Bermudagrass:



New free-flowing formulation: Active ingredients are in a stable, uniform suspension that is as easy to work with as any other Trimec Complex.

"Sometimes things are so obvious that they take you by surprise." No, that's not Yogi Berra double talk . . . It's the essence of what so many of our turf friends said when they sampled Trimec Plus last year.

Everett Mealman
President
PBI/Gordon Corporation

Listen to Sandy Queen, Certified Superintendent of Golf for the city of Overland Park, Kansas. "The minute I read the Trimec Plus label, I said to myself, Hey, this will work! I just know it will!"

It was in August of 1988 when Sandy saw the Trimec Plus label and the first thought that came to his mind was to test it against a $250.00-a-gallon post-emerge he had already purchased to use on the goosegrass of a newly seeded driving-range tee at the Overland Park Golf Course.

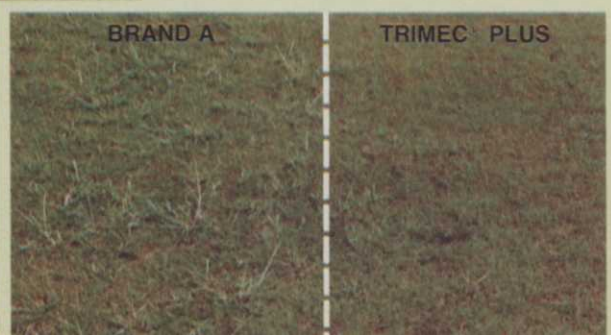
"You remember the weather last year," said Sandy, "so you won't be surprised to learn that, even though a pre-emergent had been used, the tee was loaded with goosegrass and crabgrass. We sprayed half of it with the super expensive exotic and the other half with Trimec Plus, which I believe costs $27 a gallon and, based on the rates we used, cut our cost per acre in half.

"The super expensive exotic only got the young goosegrass. It did virtually nothing on the mature plants. But that one application of Trimec Plus virtually cleaned out all the grassy weeds as well as a good deal of yellow nutsedge that was also immune to the more costly treatment."

We'll tell you what Sandy Queen saw on the Trimec Plus label that made him so sure it was a winner, but first, here are a few more comments from your peers.

Works with no burning or discoloration

Russell Kestler, who owns Rus-



Below is a polaroid showing the goosegrass control of brand A, vs. Trimec Plus. At left in photo is August Leitzen, Superintendent of Overland Park Golf Course, with Sandy Queen, Certified Superintendent of Golf for the city of Overland Park, Kansas.

1) Tom Tomlinson, left, of Lawn Doctor in Trumbull, West Redding, Connecticut with two of his drivers, Gary Schwarz (center) and Matt Werthmann. Tomlinson reports excellent results with Trimec Plus on yellow nutsedge.

2) Russell Kestler, of Russell's Landscaping, Malverne, N.Y. Kestler used Trimec Plus to control crabgrass in 85° temperature with very good results and no burning or discoloration.

sell's Landscaping of Malverne, New York out on Long Island, said, "We used Trimec Plus last season on approximately 140,000 sq. ft. of residential turf that was loaded with crabgrass. We got excellent results with just one application — and there was no discoloration or burning of the turf, even in August."

Tom Tomlinson of Lawn Doctor in West Redding, Connecticut used it on over 40 lawns last year to clean out yellow nutsedge and crabgrass. "The results were excellent," said Tomlinson. "Trimec Plus totally cleaned up an unusually heavy infestation of nutsedge and crabgrass in spite of erratic and difficult weather conditions, and in most instances only one treatment was needed.

"And guess what," continued Tomlinson. "Trimec Plus also cleaned up our clover problems."

After listening to Tomlinson, we almost think we should have named our new herbicide Trimec Plus-Plus-Plus: nutsedge *plus* crabgrass, *plus* broadleaves, *plus* economy.

Why Trimec Plus is so efficient

Now, back to what Sandy saw on the Trimec Plus label that got his enthusiasm up — it was MSMA as an ingredient in a new Trimec Complex. As a Certified Superintendent of Golf, Queen is quite naturally a dyed-in-the-wool user of Trimec and, of course, he has had extensive experience with MSMA.

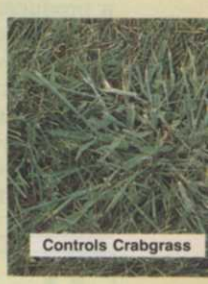
He knows that MSMA is surely one of the most effective herbicides for use on grassy weeds and sedges, but that it has a major flaw. To get enough of it into a grassy weed to kill it requires repeated applications, or so much of a wetting-and-penetrating agent that burning and discoloration will occur.

And he also knows that Trimec has a unique eutectic characteristic that gives it unparalleled penetrating power.

A new Trimec Complex

So, when MSMA is locked into a Complex with Trimec — which is precisely what Trimec Plus is — you have a superior system for delivering the MSMA to grassy weeds such as crabgrass, dallisgrass, barnyardgrass and nutsedge — and, of course, the delivery system itself, Trimec, is the undisputed number one post-emergent broadleaf herbicide for ornamental turf in all the world!

Trimec plus MSMA. But, wait! Remember that word, *Complex*.



Trimec Plus is not a tank mix of Trimec and MSMA. Trimec Plus is a specially compounded amine complex of 2,4-D, MCPP, Banvel® and MSMA . . . in a stable, uniform suspension that is as easy to work with as any other Trimec Complex.

You'd have to buy at least two or three other herbicides to do all of the things that Trimec Plus, alone, will do — control crabgrass; control yellow nutsedge; control the widest spectrum of broadleaves.

Sprayer offer: For details on how you can receive a $100-value SP-1 Back-Pack Sprayer for only $35 when you buy Trimec Plus, call our Sales Service Department.

Toll-free 1-800-821-7925.
In Missouri, 1-800-892-7281.

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HERBICIDE

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725-489

PEOPLE

Dr. Robert Kneebone and **Marlin Wian** were honored at the recent GCSAA show in Anaheim, Calif. for their contributions to the turfgrass industry.

Kneebone, a retired professor from the University of Arizona, is recognized as a leader in turf research. He has made significant contributions as a turfgrass breeder and selected the parental clones that were used in the development of SR 1020 creeping bentgrass.

Wian, superintendent at Llanerch Country Club, Havertown, Pa., was praised for his progressive, innovative and highly skilled turf management activity.

Seed Research of Oregon, a producer and marketer of elite turf grasses, sponsored the awards.

Horticulturist **Mary Halbrooks** has been chosen by Clemson University to work with South Carolina's nursery crops industry and conduct plant research.

Halbrooks

Halbrooks will also conduct research on mineral nutrition and water relations in woody plants, hoping to minimize fertilizer and water use in the nursery industry.

She holds degrees from Purdue and the University of Wisconsin.

Laurel Goddard has been appointed communications assistant for the California Landscape Contractors Association.

A graduate of Cal State Sacramento, Goddard will produce the CLCA newsletter and news releases.

She previously served an internship with the California Department of Forestry and Fire Protection's public affairs office, and was a reporter and copy editor for two local newspapers.

Harold M. Stratton, II has been elected vice president and general manager of Briggs & Stratton Technologies.

Stratton joined the company in 1977. He was previously vice president and assistant general manager.

Lawrence E. Scovotto, executive vice president of the American Association of Nurserymen, has been elected to a three-year term on the Small Business Legislative Council board of directors.

The SBLC is a Washington, DC coalition of nearly 100 national trade association members, representing more than four million small businesses.

Dr. William E. Pound has been appointed Turfgrass Extension Specialist at Ohio State University.

He serves as specialist for the county extension staff and turfgrass industry clientele and provides the public with agronomic information and recommendations regarding turfgrass in Ohio.

Pound

He will also conduct an applied research program at the university's turfgrass research facility and outlying areas.

Pound has served as a project leader for O.M. Scott & Sons Company.

Stephen J. Hoff, president of Hoffco, Inc. died recently at the age of 62 following a brief illness.

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88-90

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EVENTS

JUNE

13-16: Grow America, Nashville Convention Center, Nashville, Tenn. Contact: Vicki Miller, P.O. Box 3102, Glen Ellyn, IL 60138; (312) 790-3220.

14-16: Florida Foliage Expo '89, Diplomat Resort, Hollywood, Fla. Contact: Florida Foliage Assoc., P.O. Box 2507, Apopka, FL 32704-2507.

15-17: Texas Chapter of the International Society of Arborculture, state convention, Kerrville, Texas. Contact: Earl Caldwell, I.S.A., P.O. Box 140582, Austin, TX 78714; (512) 345-7078.

22: Tree Troubleshooting Seminar, with Dr. Alex L. Shigo. University of California Cooperative Extension, Riverside. Contact: Hartley Bennett, P.O. Box 414, Wickenburg, AZ 85358; (602) 684-7308.

JULY

7-9: American Society of Consulting Arborists consulting workshop, Tampa, Fla. Contact: A.S.C.A. at 700 Canterbury Rd., Clearwater, FL 34624; (813) 446-3356.

12-13: Association for the Use of Native Vegetation in Landscape Through Education third annual meeting, Chicago Botanical Gardens. Contact: the association at 871 Shawnee Ave. Lafayette, IN 47905; (317) 463-1943.

13-15: California Landscape Contractors' Association, Inc., summer Tri-Board meeting, Radisson Hotel, Manhattan Beach. Contact: C.L.C.A. at 2226 K Street, Sacramento, CA 95816; (916) 448-CLCA.

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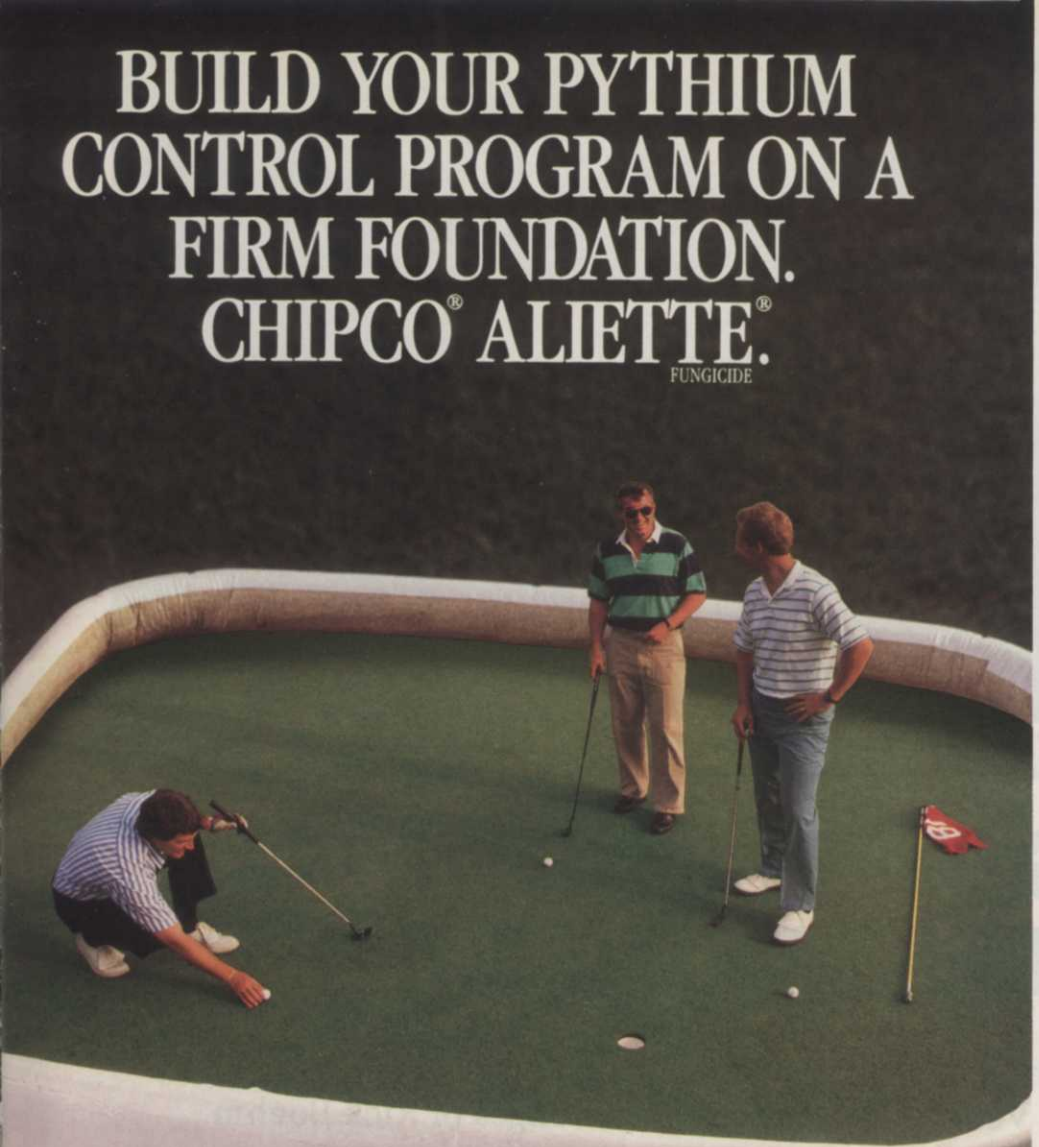

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COVER STORY

"They say I plant too many trees," says superintendent Boehm. "But I'll plant any I can get my hands on (6,000 since 1972)." He also uses 8,000 annuals, perennials, 100 tubs of ornamental grasses per year and wildflowers.

COPING WITH CONSTRUCTION...

...Not to mention the military way of doing things, and the agronomics of living in the Miami Valley. Those are the challenges of Rick Boehm.

by Jerry Roche, editor

His cronies are tearing up his golf course. There's nothing Rick Boehm can do but grin and bear it, except sometimes grasp his forehead in disbelief.

"Keeping the grass looking good is simple, compared to all the other problems," says Boehm. He is charged with maintaining the Wright-Patterson Golf Club at Wright-Patterson Air Force Base in Dayton, Ohio—not an easy task, considering the constant interference from outside equipment.

For starters, a 14-inch deep trench spanned the fairways of holes No. 10 and 14 this spring. It forced Boehm to temporarily shorten both holes until a 69,000-volt electrical line was installed. ("Fortunately, they didn't hit any of my irrigation lines," Boehm says. "I marked them the best I could.")

Elsewhere, a new portion of Interstate 675 that will be the base's main entrance is cutting the No. 11 tee off short. When that project was announced, Boehm had to move his tree nursery.

"Ninety-nine percent of the construction is not for the golf course," Boehm announces. "The only golf course construction is rerouting a water line on No. 11."

The general suggested adding railroad ties to the the 16th green, next to a pond. Since the base's environmental consultants looked disapprovingly upon using railroad ties, Boehm's crews were busy this spring constructing a vertical wall of landscape timbers.

Coping secrets

How does Boehm cope?

"I've been here for 16 years," he notes. "We're a 27-hole course, but in that time I've had to construct and reconstruct about 54 holes.

"It's crazy at times. Every day,

something seems to go astray. Every day is different, depending on mowing, weather and construction. There isn't another course I know of that has problems like us."

No, but many landscape managers who fit into the government sector (like Boehm, a WS-10-grade government employee) face some of the same problems as he. Beginning with red tape.

"It was difficult when I first got the job," remembers the veteran. "My whole theory was to try and make the best course. That doesn't fly with the military.

"You don't just go out and build a bunker. To do it the way they wanted took two years. It was awful.

"At first, I'd walk around pulling my hair out, trying to fight the system. But we've found out we have to work within the system."

"Working within the system" means two sets of pesticide records (one for the Air Force, one for OSHA) and putting up with the complaints of uninformed military personnel.

"If there are any bird or fish kills, I'm the first one they call," Boehm notes. "One time, the vehicle maintenance department was stacking its old batteries and acid was getting washed down into a pond. There was a big fish kill. I was the first one to get called on the carpet."

"Working within the system" also means donating part of the club's proceeds to what is called the base's Morale, Welfare and Recreation Fund. (This meant opening the membership up to the first 100 civilians to apply. Last year was the first year that civilians could play, which boosted annual rounds to about 70,000.)

Unearthing relics

Because of the continual reconstruction, some lower holes are built on a former dump and others on former sites of barracks.

"Once, we actually pulled up live ammo from an old gunnery site," Boehm says. "We pull up old knives and forks from the dump. From those old barracks, there are old sanitary sewers and electric lines—big lines."

Because of their placement, greens are also very difficult to keep moist during droughty periods. Boehm must continually reseed the roughs, Kentucky bluegrass cut to two inches.

Another factor that has influenced his maintenance program was the Air Force Logistics Command's (AFLC) interpretation of an EPA rule. According to Boehm's superiors, he couldn't use pesticide spray equipment (including a John Deere 1500 self-contained sprayer) for anything but spraying. The final interpretation, after Boehm tried to clarify things, has yet to be determined.

Keeping it military

This is a very military base. Very, very military: the AFLC's commanding officer, four-star Gen. Alfred Hansen (who is an avid golfer), has a house overlooking the course. Not long ago, the general suggested adding railroad ties to the the 16th green, next to a pond. Of course, Wright-Patterson's environmental consultants looked disapprovingly upon using railroad ties because of possible creosote contamination. So Boehm's crews were busy this spring constructing a vertical wall of landscape timbers. ("Maybe we'll name the hole after him," Boehm says with a wink.)

His responsibilities sometimes transcend the usual responsibilities of a civilian golf course super. He not only must maintain the course, but also some parts of its perimeter, along roads that make up the base's VIP tour. ("It's a pain.")

Boehm also received some bad marks when he began to deviate from what the airmen and officers thought the golf course should look like.

"They say I plant too many trees," says Boehm. "But I'll plant any I can

This man has been around

After 16 years of practice, superintendent Boehm has mastered the art of working with military bureaucracy.

Rick Boehm has only worked on two golf courses. But he's been around.

Boehm, who started as assistant superintendent at Weatherwax Golf Course in Middletown, Ohio, is now at Wright-Patterson Golf Club. But, as a graduate from Ohio State University in agronomics, his talents are always needed elsewhere.

"If I had ever opened up a consulting business, I'd be rich now," the jovial Buckeye says. "Everybody at the base comes to me."

Boehm has, in the past, been TDY (military terminology for "temporary duty"), consulting at Robbins AFB in Georgia, Tinker AFB in Oklahoma, Chanute AFB in Illinois and Homestead AFB in Florida. On these trips, he's lent his expertise to other Air Force superintendents.

He has also consulted for the southern Ohio cities of Cincinnati and Dayton horticulture departments.

Boehm is also very active in the Miami Valley branch of the GCSAA and the Ohio Turfgrass Foundation. He is a former president of the Miami Valley GCSA and was its newsletter editor for nine years. He is currently the organization's video librarian and a member of its board of directors. He is also a former OTF board member. How does he explain this involvement?

"A lot of new people need information, and I feel I'm one of the old farts in the organization. I get involved with everything."

Boehm's top employees are assistant Jeff Caldwell, who has been with him since 1977, and irrigation technician Bob Hoover. Besides those two, Boehm hires nine seasonal workers from a Non-Appropriated Fund list supplied to him by the Air Force.

"These are seasonal people who are required to apply by the last two weeks of February, so we have very few people to draw from." This year, though, four of the nine seasonals are back from last year.

The last conversation that LANDSCAPE MANAGEMENT had with Boehm (as this issue went to press), he was having more of the same problems as earlier in the year.

"You should have been here *this* week," he told us. "Every contractor that was on the course hit an irrigation line."

We wished him luck.

"Thanks, I need that," he laughed.

—Jerry Roche □

Despite the constant struggle with military contractors, Boehm's course looks great.

get my hands on (6,000 since 1972)." He also extensively uses about 8,000 annuals, perennials, 100 tubs of ornamental grasses per year, and wildflowers. Sometimes he uses them thanklessly.

"There was some bitching at first because everybody wanted the 'military look.' But they got used to it," Boehm explains. "Because of the placement of some trees and ornamentals, the golfers are starting to play their own hole more, rather than adjacent ones."

This use of lovegrasses, sheeps fescue, flowers and the like is not cheap. "It's pretty intensive work, but people enjoy the areas more," he observes. "We have a lot of women who enjoy the flowers and we try to appease them," even though wildflower maintenance sometimes runs twice that of turf.

Happiness is...

So why has Boehm lasted so long under such extreme working conditions?

"I love the area where I live," he answers. "I enjoy what I do. I've taken a golf course that was nothing and created something."

He likes to talk about Wright-Patterson's beautification program. Base personnel, he says, want to make the rest of the base as delightful to the eyes as the golf course is. "That makes me feel pretty good too," he beams.

Despite his 16 years at Wright-Patterson, Boehm remains on the cutting edge of new developments. His course last August became the first in Ohio to install a combination weather station/RainBird Maxi computer irrigation system.

The fruits of his labor are paying off. Late next month, Wright-Patterson Golf Club will be the site of the AFLC golf championships. A week later, the All-Air Force championship will be held there. And the following week, the all-service championships will invade. This is the first time all three major military title matches will be held at one facility in one year.

"Golfers from all over the world will be here," Boehm beams proudly. "These are serious golfers. We have to feed, house and transport them—show 'em a good time. It's going to be big."

And Boehm's course will doubtless be up to the task. Unless, of course, the engineers decide to put in a few more electrical lines. **LM**

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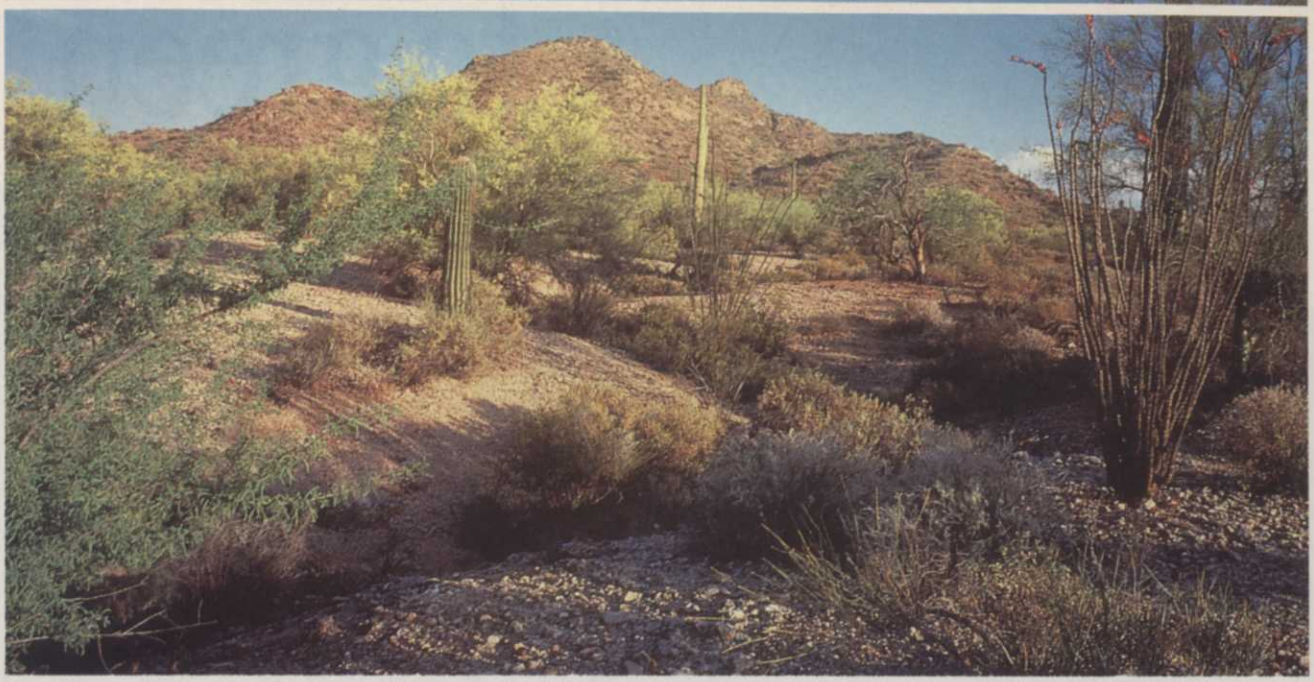

The natural beauty of Sun Valley, Arizona, exists without the benefit of plentiful rainfall.

ON A DESERTED HIGHWAY

Will a 32-mile highway median in Arizona—with more than 37,000 plants,17 million square feet of hydroseed mix and a $2.6 million budget—attract business? You can bank on it.

The Sun Valley Parkway is an unusual project in many respects.

The 32-mile, six-lane highway in the western section of metropolitan Phoenix, Arizona, is a major link in the regional transportation network. Construction of the parkway was privately funded by members of the Sun Valley Owners Association (SVOA), one of the few such projects in the country.

The parkway runs through a new 48,000-acre mixed-use development that is planned to include residential, office, commercial and industrial property. As an industrial site, the location is ideal for manufacturing and distribution centers because the parkway provides the development with easy access to major transportation routes to Southern California, Phoenix and major cities to the north and east.

Since the parkway is a major drawing card for future development, the SVOA wanted an attractive landscape design for the parkway corridor, but because the road is to be deeded to Maricopa County, the landscape had to be frugal in its maintenance needs.

Figuring climate

In the hot, dry, Southwest deserts, where daytime temperatures exceed 100 degrees more than 100 days each year, landscape designers are greatly challenged to find some middle ground between low maintenance requirements and high visual appeal. Major projects such as roadways seem to be an all-or-nothing proposition.

On the one side are various styles of irrigated landscapes with high installation and maintenance costs. Even when plantings have low water-use requirements, some irrigation must be provided. Because of the year-round warm weather, trees and shrubs grow rapidly and need frequent trimming and pruning.

The alternative is "desert" landscaping, a concept that for many years was interpreted with sparse plantings of cactus specimens set in a sterile expanse of granite ground cover.

Developers usually order landscapes designed with irrigation, accepting the maintenance burden as the price of an attractive property. Only in very recent years have designers and landscape contractors experimented with the full range of native plants, creating settings that blend naturally with the desert environment and manage to look attractive—without irrigation.

The desert design

It seems obvious that desert-dwellers would have learned how to design landscapes modeled on the surrounding scenery. And yet, the Sonoran Desert around Phoenix doesn't look anything like the stony barrens that have often been created in the name of desert landscapes.

The desert is green and lush in the spring, filled with spectacularly colorful wildflowers after the winter rains. In summer, it is more subdued in color, but still shows shades of green in grasses, shrubs and cactus specimens.

In the fall, a few scattered wildflowers bloom and grasses green up following the summer monsoon rains. Most plants stay green through the brief, mild winter, with flowers and trees showing their first blooms in late January. All of this with a total of about seven inches of annual rainfall.

It is this concept of the desert that designers Pat Nash and Laura Paty of the Planting Center in Phoenix have taken as the inspiration for the Sun Valley Parkway. They used a combination of cactus specimens, native shrubs and a hydroseed mixture with native grasses and wildflowers as ground cover. Those elements helped create a design that makes full use of a broad spectrum of native plant resources without the need for irrigation.

"We are really just discovering the potential of desert plants to provide greenery and color," Paty says. "The early desert landscapes were considered a convenience, but few designers really explored the full potential of desert plants to provide beauty in a landscape design."

Easy and safe

The design for the Sun Valley Parkway median blends easily with the surrounding desert. It has an open look that is compatible with the spaciousness of the land around it and ideal for traffic safety. Varieties selected are slow-growing, which will keep maintenance low. Plantings will not need irrigation once established, while seasonal color will provide visual interest.

Brittlebrush, a small, shrubby plant, starts the seasonal show with yellow flowers beginning in mid-winter. Bursage, another small shrub, provides the contrast of silvery foliage. Representative cactus varieties lend interesting shapes and bright spring color to the design.

Prickly pear cactus has round or oval pads that are green or tinged with purple. Spring blooms are bright yellow, followed by fruit that turns purplish as it matures.

The barrel cactus has a massive, round shape when young, with prominent ribs. It features a crown of yellow or magenta blossoms in the spring. Red-violet blooms top the smaller hedge-hog cactus, which grows as a cluster of cylindrical shapes.

Cholla introduces a sharp contrast in shape, producing spiny angular branches that resemble antlers.

Another striking silhouette is the yucca, a round cluster of sword-shaped leaves that puts out very tall, blooming stalks covered with green leaves and tipped with bright orange blooms after periods of rain. The leaves and blooms drop after a few weeks, leaving the branches completely bare.

The Sahuaro cactus, the tall massive type with "arms" that most people associate with the Sonoran desert, is not used here because the median is edged with a six-inch mountable curb. With typical Sahuraos weighing in at at least more than one ton, safety considerations rule out their use.

Choosing ground cover

Instead of using granite for a ground cover, Paty selected a hydrosed mixture that includes native grasses and wildflowers. The mix will be applied at the sides of the road to restore native vegetation destroyed by road construction and protect the area from erosion. Creosote, brittlebrush, buckwheat and a variety of low-growing grasses will be used for the roadside. In the median, a slightly different mix emphasizes low-growing and flowering plants, including desert marigold (gold to yellow-orange), sand verbana (purple) and dyssodia (yellow-white).

It has an open look that is compatible with the spaciousness of the land around it and ideal for traffic safety.

"The total effect will be natural, but the overall impression made by the landscaping is that it is a desert showcase," says Robert M. Williams, president of the SVOA. "The concept is perfect for the impact we want for Sun Valley. We have devoted a lot of effort to making the whole development compatible with the environment and at the same time convenient for the future residents and businesses that will locate here. The design of the road is based on those guidelines. This landscape has exactly the same quality."

Installation is a massive undertaking. The 32-mile median will use more than 37,000 individual plants, ranging in size from one-gallon containers to 30-inch box specimens. In the median and along the roadside, 17 million square feet of hydroseed mix will be needed. Total budget for the project, including fine grading and watering until the plantings become established, is $2.6 million.

Landscaping of the median begins this month. The project is expected to be completed late this fall. **LM**

The Sun Valley Parkway in Arizona as it looked before undergoing a $2.6 million facelift that includes more than 37,000 native plantings. Developers hope the landscaping will attract business to the area.

WARM-SEASON TURF DISEASES

For best disease control, your fungicides need to be supplemented by proper fertilization and appropriate cultural practices.

by Don Blasingame, Mississippi State University

Slime molds occur during wet weather throughout the spring, summer and fall. They disappear rapidly as soon as it becomes dry. Chemical control is usually not necessary.

Nematodes will cause almost any type of symptom that can be caused by an inadequate root system. Generally, a yellowing or off-color of the foliage is the first symptom.

The Sun Belt is blessed with a wide range of choices when it comes to turfgrass varieties. The dominant turf species used in this region is Bermudagrass. However, five other warm-season grasses are used extensively for turf purposes: St. Augustinegrass, zoysiagrass, centipedegrass, carpetgrass and bahiagrass.

Although most southern turf diseases are caused by fungi, agents such as bacteria, viruses and nematodes can cause serious problems to certain grasses.

Southern turf managers can't depend solely on fungicides for disease control. Good variety selection, proper fertilization and appropriate cultural practices are also very important in disease control. No amount of fungicide will compensate for poor fertility and cultural practices.

Knowing when the most common diseases occur also will aid managers in scheduling fungicide applications (see chart). Also, environmental conditions can induce disease occurrence and severity.

Many of the agents that cause plant disease are normally in the turf (mainly in the thatch area) waiting for the right environmental conditions to develop. In general, the ideal condition for disease development would be high temperature and moisture and heavy thatch.

Fertilizers also affect disease occurrence and severity. For example,

- Low nitrogen levels increase warm-season grasses' susceptibility to dollar spot;
- Low potash increases the severity of many turfgrass diseases, for example, Bermudagrass melting out;
- Low soil pH increases the severity of brown patch;
- Very high nitrogen levels increase the level of most of the fungual diseases of warm-season turf.

Brown patch

Brown patch is the most common turf disease in the Southeast. Although St. Augustinegrass and zoysiagrass are the most susceptible species, even the more tolerant centipedegrass, Bermudagrass and ryegrass are frequently damaged by this fungus.

continued on page 38

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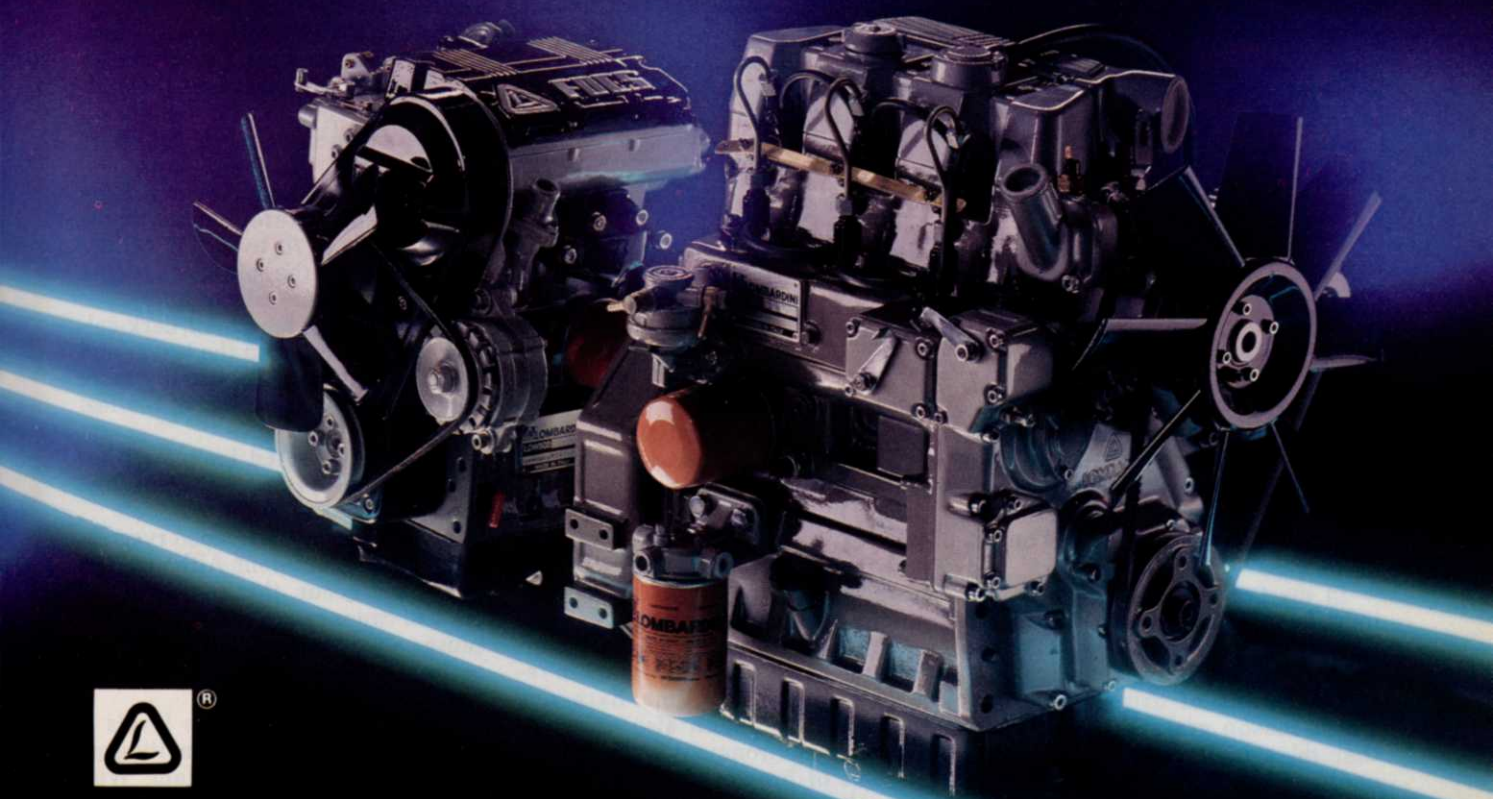

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Benomyl	Benlate, Tersan 1991	●	●					●*
Chloroneb	Terraneb SP, ProTurf Fungicide II					●		
Chlorothalonil	Daconil 2787 ProTurf 101V	●	●	●	●		●	
Ethazole	Koban 30, Terrazole					●		
Fenarimol	Rubigan	●	●					●
Iprodione	Chipco 26019 ProTurf, Fungicide VI	●	●		●			
Mancozeb	Fore, Tersan LSR Many Others	●			●		●	
Metalaxyl	Subdue					●		
PCNB (quintozene)	Terraclor Turfcide	●	●		●		●	
Propamocarb	Banol					●		
Propiconazole	Banner	●	●				●	●*
Thiophanate-ethyl	Cleary 3336	●	●		●			
Thiophanate-methyl	Fungo 50, Proturf Systemic Fungicide	●	●					
Thiophanate-methyl + Mancozeb	Duosan	●	●		●		●	
Thiram	Thiram, Tersan 75	●	●					
Triadimefon	Bayleton, ProTurf Fungicide 7	●	●				●	
Vinclozolin	Vorlan		●		●			

* Label approved only in selected states.
** Combination of fungicide + fertilizer are not included.
No endorsement of named products by author is intended, nor is criticism implied for products not mentioned.

Source: Dr. Blasingame

Brown patch is favored by warm, moist weather combined with cool nighttime temperatures. Therefore, in certain areas of the South, brown patch can and does occur any month of the year.

In the South's upper regions, the most favorable conditions for brown patch development occur from late April through mid-October.

Symptoms of brown patch on warm-season grasses are different than the symptoms of the disease on cool-season turf. Even though the grass is usually killed in a circular pattern, many times the smoke ring is not seen on southern turf.

Under certain conditions the fungus may cause a gradual thinning of the turf over a rather large area instead of killing in a circular pattern.

Several factors tend to make the grass more susceptible to brown patch. One is applying too much nitrogen fertilizer. The resulting lush growth is readily attacked. Delay nitrogen applications when disease conditions are favorable.

Another is watering late in the afternoon and allowing the grass to remain wet for a long time. Excessive thatch accumulation also creates a favorable environment for the development of brown patch and many other diseases.

Fungicides are best used on a preventive schedule (see Fungicide Guide). Once symptoms develop, control can be difficult.

Dollar spot is common on Bermudagrass, zoysiagrass and annual and perennial bluegrasses. Symptoms of dollar spot are different on certain warm-season grasses than on cool-season grasses.

On finer textured grasses such as Bermudagrass and zoysiagrass, the disease kills grass in small patches two to three inches in diameter. Under severe conditions, these patches may coalesce so that the turf has a mottled appearance. Blades of grass at the outer edges of the infected area develop tan spots with reddish-brown margins.

On coarser warm-season grasses, turf is killed in larger patches ranging up to a foot in diameter.

Dollar spot is prevalant during mild weather in the spring and fall. Unlike brown patch, dollar spot is retarded by high nitrogen levels. Still, turf managers should consider the impact of high nitrogen on brown patch and other diseases. You should water only in the early morning so the foliage can dry quickly. Fungicides can be used to help bring the disease under control once it gets established.

Leaf spot

A number of fungi cause leaf spots on many southern grasses. Regardless of the causal agent, leaf spots and their control on southern grasses are similar.

Melting out (*Bipolaris spp.*) — Bermudagrass and ryegrass are more severely affected by these infections, although the fungus can survive on centipedegrass and St. Augustinegrass.

Infection can occur over a wide range of temperature, but usually is more severe at 70 to 95° F. Milder temperatures in the spring and fall are more favorable for infection.

Melting out causes small, dark-colored spots or flecks on the leaves and sheaths. Leaf spots are usually more numerous near the collar of the leaf blades.

Severely affected leaves wither and die, and the turf frequently becomes brown and thin.

Symptoms on overseeded ryegrass are altogether different. Although leaf spots may occur, this same melting out can cause severe crown rot. This causes a yellowing and discoloration of the grass and a general thinning of the turf.

Fertilize with adequate levels of nitrogen and potassium if melting out diseases become a problem. With careful management, apply fungicides recommended for melting out blight control.

Gray leaf spots: St. Augustinegrass is the primary host for gray leaf spot.

continued on page 40

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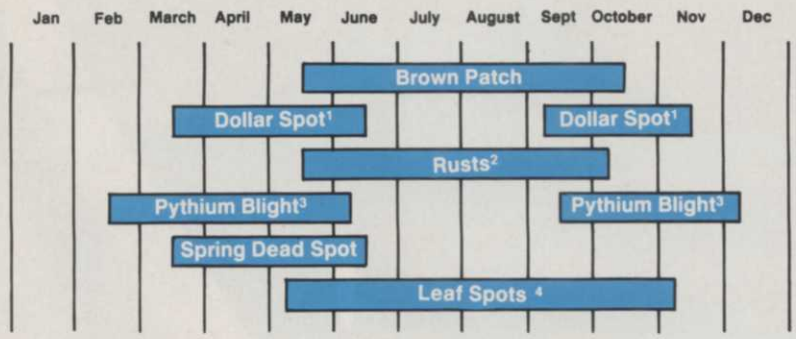
DISEASE CALENDAR

Major Diseases of Warm Season Turf*



* The calendar gives the normal time for turf diseases to occur. However, they may occur at other times depending upon environmental conditions.

1 - Dollar spot affects overseeded turf as well as warm season grasses.

2 - Rust does affect overseeded grasses but is most common on zoysiagrass.

3 - Pythium blight is most damaging on overseeded turf but can cause damage to warm season turf especially during "transition" periods.

4 - Most warm season grasses are affected by certain leaf spots. For example: gray leaf spot of St. Augustine and the helminthosporium complex on bermudagrass.

Source: Dr. Blasingame

The disease occurs throughout the lower South during warm, humid weather.

Spots on the leaf blades are the most visible, but sheath and stem lesions also occur. Leaf spots begin as olive green to brown, water-soaked spots as small as a pinhead. These enlarge rapidly and form a circular to elongated lesion that is brown- to ash-colored with purple margins. The disease occurs during moderate to warm weather accompanied by high relative humidity. Severity of the disease is enhanced by applications of nitrogen fertilizer. It is more a problem in shaded areas where the grass remains wet from dew.

Treatment with a fungicide may become necessary if the disease outbreak is severe and accompanied by prolonged periods of wet favorable weather. The fungicides chlorothalonil and mancozeb have been found to be effective in controlling gray leaf spot.

Rust

Rust of *Puccinia* species infect ryegrass, zoysiagrass, bluegrass, fescue, Bermudagrass and St. Augustinegrass. Zoysiagrass and bluegrass are the most often infected

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From sweet spot

...to dollar spot (!?%%!)

grasses.

Susceptibility depends on the variety. Fungus infection is favored by minimum and maximum temperatures of 50 to 70°F, respectively. For this reason, the disease does not usually cause severe damage over an extended period. It is likely to be more severe in shaded areas during rainy, humid weather. Affected turf will appear unthrifty and begin to thin.

The disease is characterized by the presence of pustules on the leaf blades. These pustules range from bright orange to cinnamon-brown in color, depending upon the species of fungus present.

Certain varieties of ryegrass are extremely susceptible to rust, and sometimes severe damage can occur. Zoysiagrass, especially Meyer and Emerald, are most severely infected by rust.

Fertilize to stimulate grass growth, mow on a four- to five-day schedule and catch clippings. If necessary, a fungicide may be applied to help reduce the amount of disease present. Triadimefon, chlorothalonil and mancozeb are effective in controlling rust.

Spring dead spot

Spring dead spot is a serious disease of Bermudagrass in certain parts of the upper sunbelt. It is found generally on Bermudagrass or zoysiagrass under high maintenance.

Damage to the turf apparently occurs during the dormant season. When green-up occurs in the spring, areas a few inches to several feet in diameter appear where the sod is completely dead.

Spring dead spot's causal agent has not been identified. The only control procedures recommended are good cultural practices and limiting the use of nitrogen fertilizer, especially late in the growing season.

Research has shown that fungicides can limit the damage. However, at the present time only benomyl and Rubigan are labeled, and these may be of limited use in certain states.

St. Augustinegrass decline

St. Augustinegrass decline (SAD) is caused by a virus. The symptoms are a mosaic-type chlorosis of the leaf blades that resemble nutrient deficiency or mite feeding. Evidently there are several strains of the virus since there is a great range in damage to St. Augustinegrass.

To this point, the disease has only been recorded in Arkansas, Texas, Louisiana and Mississippi. No chemicals are available for the control of SAD.

Several varieties of St. Augustinegrass, however, are resistant to the virus. These can be planted in areas where the disease is a potential problem. Floratam was the first variety released with resistance to SAD. It is also resistant to chinch bugs. It has poor cold tolerance and should be used only in the lower South. Seville is resistant to SAD and is more shade tolerant than common St. Augustinegrass. Raleigh has both SAD resistance and good winter hardiness.

No amount of fungicide will compensate for poor fertility and cultural practices. Knowing when the most common diseases occur will greatly assist landscape managers in scheduling fungicide application.

Downy mildew

Downy mildew of St. Augustinegrass was first described on common St. Augustinegrass in Texas in 1969. Since then the disease has spread and has been identified in Arkansas, Louisiana and Mississippi.

Downy mildew appears as white, raised, linear streaks that develop parallel to the mid-veins of the leaf. Streaks appear in the spring and remain throughout the summer, giving the leaves a yellow appearance with some death toward the tips. Severe disease occurs in grass grown in flood plains or poorly drained areas.

The white-streak symptom is easily confused with the virus disease, SAD. However, the virus symptoms are more yellow in color and more mottled than striped. Downy mildew has been difficult to control with most common turf fungicides. Good drainage is recommended for cultural control.

Fairy rings

Fairy rings generally appear in lawns and other turf areas as circles or arcs of dark green, fast-growing grass during the spring and early summer. A ring of thin dead grass may develop on one or both sides of this circle.

The disease is caused by one of several soil-inhabiting fungi that commonly produce mushrooms. Mushrooms that sometime appear in the ring are the fruiting bodies of these fungi. Stimulation of the grass is due to release of nutrients from the organic breakdown of the thatch by the growing fungus.

No chemicals are labeled for the control of fairy ring. Two general approaches may be considered: removal and suppression. Although relatively impractical, removing infected soil and grass to a depth of 12 inches or more in a band several feet on each side of the infected area and replacement with clean soil is one solution.

Another approach is to suppress the disease. For low-maintenance grass areas, increase the water and fertilization program to stimulate the declining grass inside the ring. Symptoms of fairy ring can be masked by pumping large quantities of water into this area.

Slime molds

Slime molds are a group of organisms that cover above-ground plant parts with a dusty gray-black or dirty yellow mass.

When you look closely at this growth, you see small round balls scattered over the plant. If you rub these between your fingers, a sooty powder emerges. This consists of spores of the fungus.

Slime molds do not feed on living plants. They only use them to assist distributing spores during reproduction. Slime molds occur during wet weather throughout the spring, summer and fall. They disappear rapidly as soon as it becomes dry. Chemical control is usually not necessary.

Nematodes

Although nematology is a fairly new field, it has seen rapid development in the past 10 years. Nematodes, small eel worms, belong to a group of microorganisms which scientists call obligate plant parasites. This term simply means that the organism lives and obtains its food only from living plants. This fact is both good and bad. On the good side, the nematodes very rarely kill the plants that they are feeding on. On the other hand, nematodes feed on the roots of the grass and take the nutrients that would normally be used by the grass. Also, this feeding activity destroys a portion of the root system and makes them much more susceptible to other disease organisms.

In many cases, increased fertilization and water will offset some of the symptoms of a light infestation of nematodes. However, this usually

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simply postpones the problem. Eventually a point is reached where no amount of water or fertilizer will substitute for the lack of a root system, and other steps must be taken to remedy the problem.

Normally, favorable conditions for turf development are also favorable for nematode development. This is particularly true in areas where highly maintained turf has a long growing season.

Heavy nematode infestation comes from an inadequate root system. Generally a yellowing or off-color of the foliage is the first symptom. This is followed by a general stunting and thinning out of the grass. Also, the turf frequently will wilt during the hot periods of the day and will respond little to fertilizer or water.

The only positive way to diagnose a nematode problem is to assay the soil around the root system of a plant. Laboratory techniques and assay procedures have been developed over the years to accurately detect not only the number of nematodes present but also the types of nematodes that are causing the problems.

A large number of different nematodes damage turfgrasses. Of course, some are more damaging than others and at different population levels. Usually in a random soil sample from a golf course or home lawn, several different types of plant parasitic nematodes may be present. For example, the single most damaging type of nematode found on Bermudagrass is known as the sting nematode (*Belonolaimus*). This very large nematode causes a great deal of mechanical damage to the root system, making it more susceptible to other types of problems.

The lance nematode (*Hoplolaimus*) is also very potent in its damage of turfgrass. The root-knot nematode (*Meloidogyne*) causes considerable damage to turfgrass. This nematode is probably best known on field crops, vegetables and on ornamentals. It causes galls and swelling of the root system, making it very easy to recognize. The lesion nematode and stubby root nematodes are also found frequently parasitizing grasses.

Ring nematodes have been found in well over 50 percent of the turf samples from the Southeast assayed by our laboratory. Other nematodes that are found in association with the unhealthy turf samples include stunt, dagger, and spiral nematodes. All of these are forms of parasitic nematodes that feed on turfgrass and probably cause some type of damage to the turf. However, they are not as economically damaging as are the first five mentioned.

Nematodes very seldom occur in an area as a single species but rather appear as mixed populations. Mixed populations normally compound the problem since each type contributes its share toward weakening the plant. Some guidelines can be set as to the amount of individual damage by nematode species; however, it is difficult to say how much damage occurs in these populations. This then becomes a matter of judgement.

Spring dead spots' causal agent has not been identified. The only control procedures recommended are good cultural practices and limiting the use of nitrogen fertilizer, especially late in the growing season.

What can be done to combat the high nematode population in turf? Several things can be done. First of all, grass should not be planted in areas where high nematode populations are already present. In other words, if high nematode populations are present in an area where you plan to plant grass, then they must be eradicated prior to seeding or sodding. This can be done by applying a soil fumigant or a nematicide. Also, turfgrass management personnel should insist upon nematode-free planting material.

As with any other type disease, prevention is much better than cure. However, measures can be taken if nematodes are present in established turf: apply a nematicide. A number of nematicides once used in turf are no longer available. All remaining nematicides have been placed on the "restricted pesticide" list and must be applied by a licensed applicator. These materials may be applied in a liquid or granular form, normally either in late spring or early fall.

Be sure to have soil analyzed for nematodes and get professional help *before* using a soil sterilant or nematicide. **LM**

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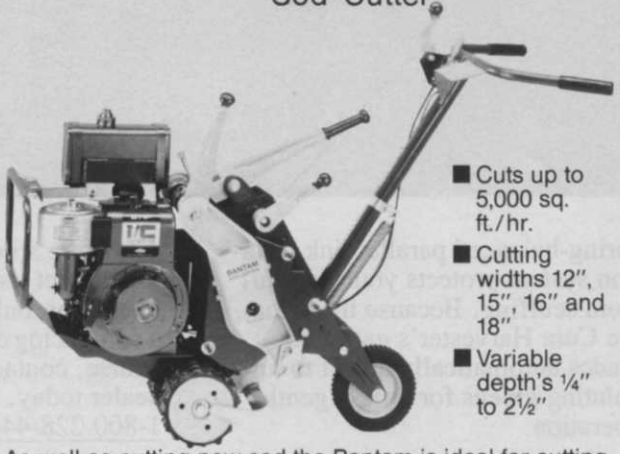

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Circle No. 107 on Reader Inquiry Card

COOL-SEASON TURF DISEASES

Integrating new ideas and new tools with accepted knowledge and fungicides is the key to successful cool-season disease management.

by Dr. Bill Shane, Ph.D., Ohio State University

Cool-season turfgrass managers face a wide variety of diseases that reduce the quality of their grass. Choosing the proper strategies for managing these diseases depends greatly on being able to identify the disease.

Attention has centered recently on the subject of turfgrass patch diseases. Although much has been learned, confusion still remains in the minds of many turf managers when it comes to determining the cause of patches in their own situation.

This article will focus on the pathogens that infect primarily basal stem, crown and root tissues of plants. The diseases discussed here are summer patch, necrotic ring spot, take-all patch and yellow patch diseases of cool-season turfgrass.

Other diseases associated with patch symptoms, (brown patch, Pythium blight, copper spot) are primarily leaf, sheath, and basal stem problems.

A recent challenge to turf managers is determining the proper way to use the relatively new group of fungicides known as the sterol biosynthesis inhibitor compounds (SBI) (triadimefon, fenarimol, propiconizole).

Another new development is the availability of turf disease diagnostic kits. This is a rapid means to determine the cause of turf decline, but it requires some new thinking to use the tool properly.

As more information is gathered about patch diseases, it is becoming clear that not all patch diseases are prevalent in all areas where cool-season turfgrasses are grown. Necrotic ring spot has been common on Kentucky bluegrass in Washington, Colorado, New York, Wisconsin, and Minnesota but less common in Pennsylvania, Maryland and Ohio.

This disease may be prominent for a few years in a region but then become obscure. For example, necrotic ring spot became very scarce in Wisconsin during the summer of 1988, according to Dr. Gayle Worf of the University of Wisconsin.

Summer patch

Summer patch, caused by the fungus *Magnaporthe poae*, is common in Kentucky bluegrass in Rhode Island, Maryland, New Jersey and New York, but apparently less so in other areas of the country. The region of the United States where summer patch is important is somewhat wider for the annual bluegrass form of the disease.

The disease has a fairly distinctive appearance on close-cut annual bluegrass/bentgrass greens. The annual bluegrass is affected whereas the bentgrass is essentially untouched.

Unfortunately, summer patch is difficult to distinguish from necrotic ring spot on Kentucky bluegrass. The most useful characteristic to distinguish the two diseases is that spots of summer patch on Kentucky blue-

Summer patch symptoms on an annual bluegrass/ bentgrass green. Only the annual bluegrass plants are affected.

Rings on Kentucky bluegrass in a lawn due to yellow patch, which is caused by *Rhizoctonia cerealis*. Photos courtesy of Dr. Shane.

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TABLE 1. TURF Guide DISEASE

COOL-SEASON TURF DISEASES, TURF DISEASE AND CONTROLS

DISEASE	SEASON AND/OR SUSCEPTIBLE TURFGRASS[2]	CULTURAL	FUNGICIDE/NEMATICIDE ACTIVE INGREDIENT[4]
Algae	All tufgrasses	Reduce shade. Avoid excessive fertilization. Improve soil drainage.	Mancozeb
Anthracnose ***(Colletotrichum graminicola)***	July-August; ANNUAL BLUEGRASS, BENTGRASS, Fine Fescue	Fertilize and water to maintain vigor. Syringing may help to prevent stress.	Benomyl[3], Triadimefon Thiophanate-Methyl[3] Propiconizol, Fenarimol, Chlorothalonil
Brown Patch -	See Rhizoctonia blight		
Dollar Spot ***(Lanzia*** **and Moellerodiscus spp., formerly** ***Sclerotinia homeocarpa)***	Late June-Oct. BENTGRASSES BLUEGRASSES Fescues Ryegrasses	Avoid nitrogen deficiency. Remove dew from greens by mowing, dragging with a hose or pole. Choose more resistant grass varieties.	Chlorothalonil, Cadmium[3], Benomyl[3], Anilizine[3], Fenarimol, Iprodione[3], Propiconizol, Thiophanate- ethyl[3], Thiophanate-methyl[3], Thiram, Triadimefon, Vinclosolin[3]
Fairy Rings (Basiodomycete soil fungi)	April-October All turfgrasses	Remove infested sod and soil, replace with clean soil and reseed or sod. Improve water penetration. Increase N fertilization.	Methyl bromide or Formaldehyde fumigation will eradicate fungus but will also kill turf
Fusarium Blight[5] ***8Fusarium poae, F. vulmorum, F. crookwellense)***	July-August Bluegrasses Bentgrasses Fescues	Reduce heat stress during dry periods by light, frequent watering. Do not cut Kentucky bluegrass ro fescues under 2 inches. Reduce excessive thatch (over ¾ inch).	Triadimefon, Fenarimol Benomyl[3], Iprodione, Thiophanate-methyl[3], Thiophanate-ethyl[3]
Fusarium Patch (Pink Snow Mold) (*Fusarium nivale*)	Nov.-April Bluegrasses Bentgrasses Fescues Ryegrasses	Avoid late fall fertilizing. Rake leaves and cut short. Control drifting snow.	Triadimefon, Benomyl[3], Fenarimol, Iprodione[3], Mancozeb, Mercury chlorides, Pentachloronitrobenzene, Thiram, Thiophanate-methyl[3], Vinclozolin
Grey Snow Mold-	see Typhula blight		
Leafspot/Blight /Melting out (*Drechslera* & *Bipolaris* ssp.)	Leafspot: Spring & fall; Blight & Melting out: June-Aug. KENTUCKY BLUEGRASS BENTGRASSES FINE FESCUE, ryegrasses, tall fescue	Remove clippings. Raise cutting height. Avoid excessive nitrogen. Avoid light, frequent watering.	Cycloheximide, Iprodione, Chlorothalonil, Mameb, Nancozeb, Vinclozolin, Pentachloronitrobenzene
Nematodes	All turfgrasses		Fenamiphos, Ethoprop

grass tend to remain small (3 to 10 inches in diameter) compared to necrotic ring spot (5 inches to 2 feet).

Until recently, identification of summer patch by plant disease clinics has been hampered; the causal fungus displays no consistent distinguishing features when grown on agar in a petri plate.

Formerly, the causal agent was thought to be the fungus *Phialophora graminicola*. This was a major source of confusion to plant pathologists because this fungus was known to be a non-pathogen on cereal crops.

A breakthrough

A major advance in our understanding of summer patch occurred when Peter Landschoot (now at Pennsylvania State University) and Noel Jackson (University of Rhode Island) discovered that there are two mating types, 'A' and 'a', for the causal agent now known as *Magnaporthe poae*. If a suspected *M. poae* strain is paired with the proper mating type, the sexual spore stage (ascospores) is formed and positive identification can be made. Thus, identification of summer patch is now possible, but still takes up to two months.

Yellow patch

Yellow patch, caused by *Rhizoctonia cerealis*, is frequently found on Kentucky bluegrass in Ohio and apparently less frequently in Michigan and Illinois. It is rarely reported in Wisconsin and Minnesota. The bentgrass version of the disease is more often seen in the northern

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Circle No. 104 on Reader Inquiry Card

TABLE 1 **TURF Guide DISEASE**

COOL-SEASON TURF DISEASES, TURF DISEASE AND CONTROLS

DISEASE	SEASON AND/OR SUSCEPTIBLE TURFGRASS[2]	CULTURAL	FUNGICIDE/NEMATICIDE ACTIVE INGREDIENT[4]
Necrotic Ring Spot[5] (*Leptosphaeria korrae*)	Spring & fall KENTUCKY BLUEGRASS, annual bluegrass ryegrasses	Avoid low mowing heights (below 2 inches). Reduce excessive thatch (over ¾ inch). Use Kentucky bluegrass and perennial ryegrass mixtures.	Fenarimol, Propiconizol
Pink Patch[6] (*Limonomyces roseipellis*)	Spring & fall bentgrass, FINE FESCUE, PERENNIAL RYEGRASS	Follow balanced fertilization program.	Cadmium, Mancozeb
Pink Snow Mold -	see Fusarium patch		
Powdery Mildew (*Erysiphe graminis*)	July-Oct. KENTUCKY BLUEGRASS, fine fescue	Reduce shade. Increase air circulation by removing surrounding vegetation.	Triadimefon, Fenarimol, Propiconizol
Pythium Blight (*Pythium aphanidermatum, P. graminicola*)	June-Sept. BENTGRASSES, ANNUAL BLUEGRASS, PERENNIAL RYEGRASS, Kentucky bluegrass	Improve soil drainage. Increase air circulation by removing surroundign vegetation. Avoid mowing wet grass. Avoid excess watering.	Chloroneb, Etridiazole, Propamocarb, Metalaxyl, Fosetyl-Al, Mancozeb
Red Leaf Spot (*Drechslera erythrospila*)	June-Sept. BENTGRASSES	Remove clippings. Fertilize to maintain vigor.	Iprodione, Anilizine
Red Thread (*Laetisaria fuciformis*)	All seasons PERENNIAL RYEGRASS, FINE FESCUE, bentgrass, annaul bluegrass, Kentucky bluegrass	Follow balanced fertilization program.	Vinclozolin, Cadmium, Chlorothalonil, Thiophanate-ethyl, Thiophanate-methyl, Nancozeb, Triadimefon Propiconizole
Rhizoctonia Blight (Brown patch) (*Rhizoctonia solani* = *Thanatephorus cucumeris*)[7]	July-August BENTGRASS, ANNUAL BLUEGRASS, TALL FESCUE, Kentucky bluegrass, fine fescue	Avoid excess nitrogen fertilization. Increase air circulation. by removing surrounding vegetation. Avoid excessive watering.	Anilizine, Chlorthalonil, Mancozeb, Benomyl[3] Maneb, Propiconizole, Pentachloronitrobenzene, Triadimefon, Thiophanate-methyl[3], Thiophanate-ethyl[3], Iprodione
Rust (*Puccinia spp.*)	August-Oct. PERENNIAL RYEGRASS, KENTUCKY BLUEGRASS	Avoid nitrogen deficiency. Use resistant varieties of Kentucky bluegrass and perennial ryegrass.	Mancozeb, Propiconizole, Cycloheximide, Chlorothalonil, Triadimefon, Fenarimol
Slime Molds (*Myxomycete*9	August-Sept. All Turfgrasses	Removing mechanically by mowing or raking.	Zineb, Mancozeb
Snow Mold -	see Fusarium Patch and Typhyula Blight		

United States and Canada.

Two features are useful in distinguishing yellow patch from necrotic ring spot and summer patch. Plants suffering from yellow patch display a white, shredded appearance of the basal stem tissue. In addition, leaf spots somewhat reminiscent of dollar spot are sometimes present on the portion of the leaf blade closest to the leaf sheath.

Yellow patch is generally a less severe disease problem than summer patch and necrotic ring spot but will on occasion cause unsightly patches and scars on Kentucky bluegrass turf.

Take-all patch

Take-all patch, also known as Ophiobolus or Gaeumannomyces patch, is primarily restricted to bentgrass. It is most common to the Pacific Northwest, Northeast and mid-Atlantic regions of the country. It has been reported less frequently in other states such as Wisconsin, Pennsylvania, Michigan and Ohio.

The key for identifying this disease is to watch for it on newly-established greens, especially those greens with high soil pH (> 7). It is also primarily a problem only on bentgrass.

Why these various patch diseases

You never know what's hit you when you see patch disease. It could be Fusarium blight. Or necrotic ring spot. Or summer patch. Or take-all patch. Or spring dead spot. Or any combination.

They all look very similar on turf. Only with a microscope can you tell them apart. So guessing which one's causing your patch disease still leaves your turf open to the other four.

That's why complete coverage pays. And only Rubigan is labeled to prevent and treat all five of these pathogens that cause patch disease.

Not to mention dollar spot, snow mold, copper spot, red thread and stripe smut. And this spring is an excellent time to begin your preventive program.

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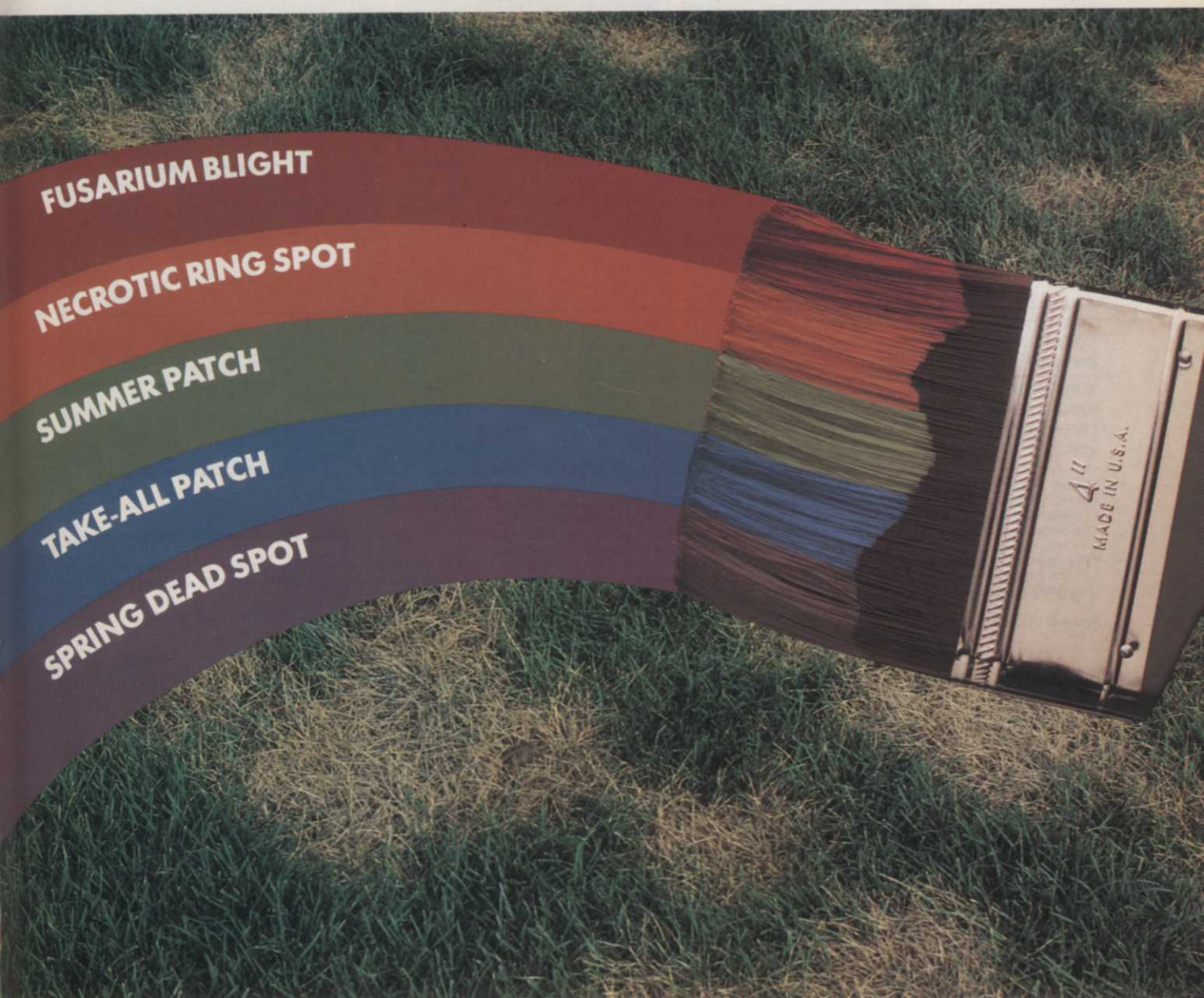

TABLE 1. TURF Guide DISEASE

TABLE 1
COOL-SEASON TURF DISEASES, TURF DISEASE AND CONTROLS

DISEASE	SEASON AND/OR SUSCEPTIBLE TURFGRASS[2]	CULTURAL	FUNGICIDE/NEMATICIDE ACTIVE INGREDIENT[4]
Strip Smut (*Ustilago striiformis*)	Spring & fall KENTUCKY BLUEGRASS, Bentgrasses	Avoid drought stress. Avoid excess nitrogen.	Propiconizole, Triadimefon, Benomyl, Thiophanate-ethyl *Notes.* Apply extra water for crown penetration. Apply in late fall or early spring
Summer Patch[5] (*Magnaporthe ssp.*, formerly *Phiaophora graminicola*)	June-August ANNUAL BLUEGRASS, KENTUCKY BLUEGRASS	Avoid low mowing height. Reduce excessive thatch. Light, frequent watering during dry periods to reduce heat stress. Use slow-release nitrogen to avoid nutrient depletion. Use Kentucky bluegrass and perennial ryegrass mix.	Fenarimol, Triadimefon; Materials must be applied preventatively.
Take-all Patch (*Ophiobolus patch) (gaeumannomyces graminis* var *avenae*)	Spring & fall BENTGRASS	Avoid topdressing soil with pH greater than 6.0 Avoid use of lime, especially small particle type, where take-all is a problem. Use ammonium chloride, or second best, ammonium sulfate fertilizers.	PMA (not labelled for this disease, but may be effective)
Typhula Blight (Grey Snow Mold) (*Typhula spp.*)	Nov.-April fine fescue, BENTGRASS, ANNUAL BLUEGRASS, Kentucky bluegrass, tall fescue, perennial ryegrass	Avoid heavy fall nitrogen promoting late lush growth. Rake leaves and cut short. Control drifting snow.	Triadimefon, Cadmium, Chloroneb, Anilizine, Pentachloronitrobenzene, Mercury Chlorides, Thiram
Yellow Patch (*Rhizoctonia cerealis*)	Spring & fall Bentgrasses Bluegrasses	Reduce excessive thatch. Avoid excessive watering.	None
Yellow Tuft (Downy mildew) (*Sclerophthora spp.*)	Spring & fall Bentgrass		Metalaxyl

1 Before using any pesticide, read and follow all label instructions.
2 Grass types listed in capital letters have been observed to be especially susceptible to the pathogen.
3 Continued or sole use of these materials may favor build-up or resistant fungal population.
4 Products containing these active ingredients are listed in the following table. Read the product label to see if it is labelled for the disease of concern. Follow all label instructions.
5 Necrotic ring spot ans summer patch are known to cause symptoms once attributed solely to Fusarium blight.
6 Pink patch disease was recently found to be a disease distinct from red thread. Thus, there are few fungicides specifically registered for contorl of this disease at this time.
7 Anothe fungus, *Rhizoctonia zeae*, is also capable of causing brown patch-like symptoms on bluegrass and bentgrass. Benzimidazole type (Tersan 1991, Benomyl, Fungo 50, Clery 3336) are not effective against this pathogen.

Source: Dr. Shane

are prevalent in different regions of the country is still unclear. Most likely reasons are the result of climatic differences and because the causal fungi have not spread to all cool-weather turf growing areas.

Our picture of the diseases in each region of the country is still fragmentary, largely because the diseases are difficult to identify in the field and laboratory.

An exciting development for the turfgrass disease industry has been a new class of fungicides collectively known as the sterol biosynthesis-inhibiting fungicides (SBI) (Table 3). Three are currently labelled for turfgrass diseases, and more are being developed.

Welcome SBI fungicides

Most fungi attacking turf synthesize ergosterol, a sterol used in their cell membranes. The SBI fungicides control many fungi by blocking the synthesis of ergosterol. For this reason, an alternate name, ergosterol biosynthesis inhibitors (EBI), is sometimes used. Fungi, such as those causing Pythium blight and downy mildew that do not manufacture ergosterol, are not controlled by these fungicides.

SBI fungicides are systemic. They have a rather broad spectrum of activity, although not as broad as chlorothalonil or mancozeb (Table 4). Most SBI fungicides do not have good protectant action but rather work best

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Table 2.

FUNGICIDE DIRECTORY

TRADE NAMES OF TURFGRASS FUNGICIDES AND NEMATICIDES

Active Ingredient	Some Common Trade Names[1]
FUNGICIDES	
Anilizine	Dyrene, Lescorene, Proturf Fungicide III, Lofts Lawn Fungicide
Anilizine + maneb w/ zinc	Faesy & Besthoff Lawn and Turf Fungicide
Benomyl	Tersan 1991, Rockland Benomyl, Lebanon Fungicide Type B
Cadmium chloride	Caddy
Cadmium chloride + thiram	Dexol Thiram Plus Lawn Fungicide, Lesco Snow Mold Turf Fungicide, Cleary's Granular Turf Fungicide, Cleary's Cad-Trete, Lebanon Fungicide Type T
Cadmium chloride + thiram + zineb	Bonide Lawn Fungicide
Cadmium sebacate + thiram + potassium chromate	Kromad
Cadmium succinate	Cadminate
Chloroneb	Tersan SP, Teremec SP, Proturf Fungicide II
Chlorothalonil	Daconil 2787, Lebanon Fungicide Type D
Cycloheximide	Acti-dione TGF
Cycloheximide + PCNB	Acti-dione RZ
Cycloheximide + thiram	Acti-dione Thiram
Ethazol (etridiazole)	Koban, Terrazole
Fenarimol	Rubigan
Fosetyl-Al	Aliette
Iprodione	Chipco 26019, Proturf Fungicide VI
Mancozeb	Fore, Formec, Dithane M-45, Dithane F-45, Lesco 4, Manzate 200 DF
Maneb	Dithane FZ, Dithane M-22
Maneb + zinc sulfate	Tersan LSR, Dithane M-22 w/Zinc, Lesco 4 F w/Zinc
Mercury chloride	Calo-chlor, Calo-gran
Metalaxyl	Subdue, Proturf Pythium Control
Pentachloronitrobenzene (PCNB, quintozene)	Terraclor, Turfcide, Lawn Disease Preventor, Lesco PCNB
Phenylmercuric acetate	PMAS
Phenylmercuric acetate + thiram	Proturf Broad Spectrum Fungicide, 24-5-3 Fertilizer Plus Fungicide
Propamocarb	Banol
Propiconizol	Banner
Thiabendazole	Tobaz, Mertect 140F
Thiophanate-ethyl	Cleary's 3336 F, Cleary's 3336 WP
Thiophanate-ethyl + thiram	Bromosan WP, Bromosan F
Thiophanate-methyl	Fungo 50, Spot-Kleen, Topsin M, Proturf Systemic Fungicide
Thiophanate-methyl + mancozeb	Duosan
Thiophanate + iprodione	Proturf Fluid Fungicide, Disease Control Plus Fertilizer 23-3-3
Thiram	Tersan 75, Spotrete, Thiramad
Triadimefon	Bayleton, Proturf Fungicide 7, Lebanon Turf Fungicide
Triadimefon + metalaxyl	Proturf Fluid Fungicide II
Triadimefon + thiram	Proturf Fluid Fungicide III
Vinclozolin	Vorlan
Zineb	Zineb
NEMATICIDES	
Ethoprop	Mocap
Fenamiphos	Nemacur

Source: Dr. Shane.

[1]Many products may be available only through specialized dealers or only in large quantity. Some products can be purchased and applied only by licensed pesticide applicators. This list is presented for information only. No endorsement is intended for products mentioned, or is criticism meant for products not mentioned.

systemically. SBI fungicides are particularly effective against powdery mildew, rusts and stripe smut.

Jury still out

Information is still incomplete for the activity of these fungicides against the slow-growing root and crown diseases necrotic ring spot, summer patch and yellow patch. Current opinions are that fenarimol and possibly propiconizole provide good action against necrotic ring spot.

Triadimefon is reported to have action against summer patch; effectiveness of fenarimol and propiconizole against this disease is not clear.

With all these patch diseases it is important to apply the fungicides before the symptoms appear. No chemical has been shown to be effective against yellow patch in the field.

Fungicide resistance

Resistance of fungi to fungicides is a constant threat, especially those with systemic action. Resistance of fungi to MBC-releasing fungicides (benomyl, methyl- and ethyl- thiophanate), acylalanine (metalaxyl), and iprodione and vinclozolin fungicides has occurred where the compounds have been used frequently.

Resistance of turf disease fungi to SBI fungicides has not yet been reported. Resistance to SBI has been noted for other systems such as apple scab on apples and powdery mildew on ornamental plants.

It is prudent to assume that resistance to SBI fungicides can and will occur with turfgrass diseases.

Although it appears that a variety of SBI fungicides can be chosen, in actuality all the products being developed for turf have the same mode of action. If a fungus develops resistance to one, it will have resistance to them all.

With most fungicides the appearance of resistance is "all or nothing"—meaning that a fungus with resistance is able to tolerate very high concentrations of the fungicide.

With SBI fungicides, resistance is cumulative; meaning the fungus can still be controlled (for a while) at a higher fungicide dose. As a result, resistance of fungi to SBI fungicides will be more difficult to detect because the fungicides will still control the pathogen, although less satisfactorily.

Basic rules apply

As with any fungicide, it is important to switch or tank mix fungicides with different modes of action to delay or avoid resistance build-up.

Another well-documented effect

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TABLE 3.

FUNGICIDE DIRECTORY

Sterol biosynthesis-inhibiting fungicides labelled for or being developed for turfgrass disease control.

ACTIVE INGREDIENT	TRADE NAME	OTHER NAME	COMPANY	CHEMICAL CLASS
LABELLED				
fenarimol	Rubigan	—	Elanco	pyrimidine
triadimefon	Bayleton	—	Mobay	triazole
propiconizole	Banner	Tilt	Ciba Geigy	triazole
EXPERIMENTAL				
penconazole	Spotless	—	Uniroyal	triazole
—	Lynx	HWG 1608	Mobay	imidazole
prochloraz	—	—	Noram	imidazole
flusilazol	Nustar	—	DuPont	triazole

Source: Dr. Shane

TABLE 4.

FUNGICIDE DIRECTORY

Activity of sterol biosynthesis inhibiting fungicides against selected diseases of turfgrass.

ACTIVITY	DISEASES
poor	leafspot (*Drechslera* and *Bipolaris* species)
fair to good	brown patch *(Rhizoctonia solani)* anthracnose *(Colletotrichum graminicola)*
good to excellent	rust (*Puccinia* species) powdery mildew (*Erysiphe* species) stripe smut *(Ustilago striiformis)* dollar spot (*Lanzia* and *Moellerodiscus* species)

Source: Dr. Shane

of SBI fungicides is their growth-regulating effect on the turfgrass plant. High rates of fenarimol can depress *Poa annua* growth. Some SBI fungicides may induce a noticeable greening of other grass species.

There are some indications that high rates of SBI fungicides may in some instances slightly retard the growth of grass types other than *Poa annua*. This is not detrimental except in cases where vigorous growth of turf is desirable; for example, if leaf production is needed to fill out a poor grass stand.

Disease detection kits

A new approach has been developed for the age-old problem of identifying turf diseases. Antibodies—tiny proteins in the immune system of mammals—allow the recognition and neutralization of invading pathogens.

With current technology it is possible to produce antibodies to recognize turf pathogens for diagnostic purposes. With this approach a small sample of leaves suspected of harboring a plant pathogen is ground. The sap is then tested for the proteins or carbohydrates specific to the pathogen.

Agri-Diagnostics and Associates (Cinnaminson, NJ 08077) has developed a kit (Reveal) that positively identifies dollar spot, warm-weather Pythium blight, and brown patch in 10 minutes.

An innovative feature of the Reveal kit is that positive and negative controls are included with each test to insure that it is done correctly.

More kits to come

Antibody-based diagnostic tests for other turf diseases such as necrotic ring spot and summer patch are being developed in other laboratories. These kits allow disease problems to be quickly identified so that proper selection of fungicides can be made.

A knowledgeable turf manager can identify most common turf diseases when the symptoms are typical. However, even the most careful observer can be mislead when disease symptoms and signs are atypical or non-definitive. For example, mycelial growth on tall-cut grass can be due to Pythium blight, brown patch, or Nigrospora blight.

As with traditional methods for diagnosing disease, the quality of the grass sample collected for diagnosis is important for successful use of antibody-based techniques. The pathogen responsible for a patch symptom on a grass stand will usually decline to undetectable levels within a few days of symptom expression.

Note kit selectivity

It is also important to know the selectivity of the tests used. For example, the Agri-Diagnostic test for brown patch used in 1988 was specific for *Rhizoctonia solani* and did not react to most isolates of *Rhizoctonia zeae*, a fungus that also may cause brown patch symptoms.

The antibody kits will react against living and non-living forms of the target fungus. Some turf managers may use the kits to see if a fungicide application was effectively stopping a disease epidemic. However, sufficient time must be given for a fungicide to act and the fungal population to decline through mowing and deterioration before the grass is tested again. Experience has shown that 2 or 3 days are needed to see the results of a fungicide application with the antibody kits.

An attractive aspect of antibody-based diagnostic kits is that the turf manager can in some instances very quickly determine (or at least rule out) one possible cause of a turf problem.

Costs for the diagnostic kits may be an issue, especially for lawn care companies and diagnostic clinics. Current costs for the rapid assay format of the Agri-Diagnostic kits is more than $15 per test. The kits may be economical for golf course settings, in situations where lawsuits may be pending, or for special customer-relation cases. **LM**

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A STRONGER SOD

The cornerstone of quality sod is shear strength, which comes about only after strict turfgrass management principles are implemented.

by J.R. Hall III, Ph.D.,Virginia Tech

In sod production and athletic field management, strong, tear-resistant turf is desirable. Sod producers and installers want sod that holds together for trouble-free harvesting and installation. Athletic field managers want tough, shear-resistant turf to maximize footing and minimize player injury.

Anywhere turf is being used to provide stable footing for athletic or recreational use, good root systems are important. Recreational turf managers desiring to maximize turf shear strength need to set up management programs that put into practice principles that maximize sod shear strength.

Shear strength of turf is the force required to tear or break a turf apart. It is one of several components that influence the tendency of a turf to "fail" or provide inadequate footing. Other factors such as root-soil binding force, soil moisture and texture, leaf succulence, etc. can also influence the tear resistance of a turf. The force with which roots bind to soil is a major factor relevant to athletic field footing.

The force with which roots bind to soil is a major factor relevant to athletic field footing.

Cleat damage is one of the negative side effects of turfgrass with inadequate root development.

Binding tendencies

Anyone who has compared the force required to pull Kentucky bluegrass and goosegrass from the soil realizes there are great differences in root-soil binding tendencies of grass plants. Kentucky bluegrass does not appear to bind as strongly to the soil as perennial ryegrass. However, "knitting" together of Kentucky bluegrass by rhizomes does give bluegrass an ability to hold together as a sod better than perennial ryegrass.

Most work on turfgrass strength has been done measuring the force required to break the turf apart after it has been exposed to various management practices. Little work has been done on the other factors influencing the tear resistance of a turf. Developing a management system that maximizes root production is obviously important to maximizing turf strength whether one is managing weakly soil-blended Kentucky bluegrass or strongly soil-bound perennial ryegrass.

Rhizomes and stolons contribute to turfgrass strength. However, root mass near the surface of the soil and the tendency of the roots to bind to soil are also extremely important factors.

Other factors

Nutrition, genetics, moisture, temperature, mowing, light, hormones, compaction, herbicides, diseases, insects and nematodes are major factors that affect the development of a root system. All of these factors function as links in a chain. If any one of these is not being dealt with then root production can suffer.

Although all nutritional elements and soil pH are important to root production, phosphorus and nitrogen appear to be the most influential. Of these two, nitrogen is most often mismanaged.

Research and practical observation has illustrated that late fall fertilization of Kentucky bluegrass, creeping bentgrass and tall fescue leads to increased density, root growth, drought tolerance and fall to spring color, as well as decreased spring mowing (when contrasted with spring fertilization) and decreased weed and summer disease problems.

Excessive spring and summer nitrogen stimulation of cool-season grasses produces green, thin-celled leaf tissue at the expense of stored food reserves and root system. It is this same depleted, stored food energy pool that is called on to heal traffic damage, mobilize disease resistance mechanisms and provide energy during extended periods of drought. Therefore, depleting stored food reserves through nitrogen mismanagement is frequently the cause of poor summer turf quality.

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Research on tall fescue-Kentucky

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Recreational turf managers need to implement programs that promote the development of a strong, deep root system. Among the most important management factors are proper nutrition and moisture levels, temperature, mowing height and others.

bluegrass sod has illustrated the inverse relationship between nitrogen and tall fescue-Kentucky bluegrass shear strength. This same work was unable to establish a definite relationship between nitrogen and root number in the surface 3/4 inches.

The principle of excessive nitrogen reducing bermudagrass shear strength has been illustrated by Mitchell and Dickens. They examined the impact of nitrogen fertilization on the sod strength of Tifway and Tifgreen bermudagrass and showed a tendency for 0.5 lb N/1000 sq. ft. applications at 4 week intervals to produce greater shear strength than 2 lb. N/1000 sq. ft. applications at either 2 or 4 week intervals. Therefore, moderate levels of nitrogen application appear to be important in the development of maximum shear resistance in both cool-season and warm-season grasses.

Choosing aggressive varieties that perform well in your region is a particularly important. A variety may have superior shear resistance in one region of the country and have susceptibility to a disease in another region. Such a condition minimizes the importance of shear strength because the disease destroys turf quality.

Proper moisture

In the transition zone, Kentucky bluegrass varieties such as America, Victa, Sydsport, Georgetown, Cheri, Vantage, Baron, Ennundi, Classic, Merit, Midnight and Gnome have provided a good combination of quality and shear resistance.

Maintaining adequate but not excessive moisture on athletic field turf is critical. Wet turf will certainly shear easier than dry turf. There is the practical management concern of needing to maintain enough moisture in the profile to keep root hairs alive while not putting so much moisture in the soil that increased comparison and shear damage is likely.

Aerification is a management practice that is absolutely essential to the quality production of turf on an athletic field.

Soils are more prone to compaction damage when they are near field capacity. Therefore, allowing fields time to dry prior to compacting events will certainly reduce compaction-related problems and minimize shear strength. Likewise, fast use of rain tarps prior to events can prevent significant loss of turf shear strength.

Maintaining athletic fields with excessive moisture also leads to succulent leaf tissue which reduces footing.

Cool-season grass root production is going to be maximum during spring. There is a secondary burst of root growth associated with the cool weather of fall, but it is paltry compared with spring root production.

Summer's high temperatures are going to minimize the potential to increase shear strength through summer root generation. Syringing of athletic turf will be helpful in reducing the mid-summer root dieback caused by excessive high temperature.

The drought resister

The bermudagrasses are, of course, very capable of sustaining good root growth through hot summer temperatures. As temperatures cool in the late summer and early fall, bermudagrass root growth will slow, naturally decreasing shear resistance. This lost shear strength can be minimized with the use of plastic and geotextile tarps that trap heat and keep the bermudagrass green and growing roots.

Maintaining proper mowing frequency is critical to maintaining the maximum root system and shear strength. Actual mowing frequency needs to be geared to the growth rate and frequent enough to not be removing more than 1/3 of the existing green tissue with any one mowing (excessive defoliation of turfgrass has been shown to cause substantial root dieback).

There is a direct relationship between shoot tissue and the amount of root system that can be sustained by it. Obviously then, higher mowing heights will lead to greater root production. Whether or not a higher mowing height will lead to increased shear strength is not clear.

Agronomic principles dictate that higher mowing heights will produce greater root systems. However, higher mowing heights did not produce greater sod shear strength on tall fescue-Kentucky bluegrass mixtures and Tifway and Tifgreen bermudagrass.

Mowing frequency

Work by Jusks and Hansen on Kentucky bluegrass has demonstrated that more frequently mowed turf has less potential for root, rhizome and shoot production. Kentucky bluegrass maintained at a two-inch mowing height and mowed 5 times a week had 21 percent less root system and 34 percent less rhizome growth than the same turf mowed once per week. In this same study, turf mowed at one inch and mowed 5 times per week had 46 percent less roots and 45 percent less rhizomes. Therefore, maintaining a reasonable mowing frequency and mowing height will likely maximize shear strength by maximizing root and rhizome development in Kentucky bluegrass.

continued on page 64

Three ways Mazda trucks outperform the competition.

1989 Mazda B2200

If you're about to commit your company's resources to building a truck fleet, you've probably looked at Ford Ranger, Chevrolet S-10, Toyota and Nissan. But your shopping list isn't complete until you've taken a good look at Mazda. Because Mazda trucks offer some very important advantages over the competition.

Mazda trucks: Number one in overall customer satisfaction for three straight years.*

1986	1987	1988
MAZDA #1	MAZDA #1	MAZDA #1
TOYOTA #2	TOYOTA #2	TOYOTA #2
NISSAN #5	NISSAN #3	NISSAN #4
CHEVROLET S-10 #6	CHEVROLET S-10 #7	FORD RANGER #8
FORD RANGER #9	FORD RANGER #9	CHEVROLET S-10 #10

Mazda B2200 Cab Plus. Combining spaciousness with practicality, the Cab Plus is the first extended-cab compact truck that allows two adults to sit facing forward in optional rear jump seats.

Mazda trucks: Offer a 36-month/50,000-mile "bumper-to-bumper" warranty— The best in the truck business.**

MAZDA	TOYOTA	NISSAN	FORD	CHEVROLET†
36 MONTH 50,000 MILE WARRANTY	36 MONTH 36,000 MILE WARRANTY	36 MONTH 36,000 MILE WARRANTY	12 MONTH 12,000 MILE WARRANTY	12 MONTH 12,000 MILE WARRANTY

Mazda trucks: Offer the most truck for your money.††

Standard Features	Mazda B2200 Base	Toyota Standard	Nissan Standard	Ford Ranger "S"	Chevrolet S-10 "EL"
5-speed	Standard	N/A	Standard	Standard	Standard
Automatic transmission	Optional	N/A	Optional	N/A	N/A
Double-wall cargo bed	Standard	Standard	Standard	Standard	Standard
Tinted glass	Standard	Optional	N/A	Standard	Optional
Steel-belted radials	Standard	Standard	Standard	Standard	Standard
Full carpeting	Standard	N/A	N/A	N/A	N/A

To find out even more ways Mazda outperforms the competition, contact:
Fleet Department, Mazda Motor of America, Inc.
7755 Irvine Center Drive, Irvine, CA 92718.
Or call (714) 727-1990.

* J.D. Power & Associates 1986 and 1987 Compact Truck CSI and 1988 Light-Duty Truck CSI customer satisfaction with product quality and dealer service.
** Warranty coverage without deductible. See your Mazda Dealer for limited warranty information.
† GM's 36-month/50,000-mile "Bumper-to-Bumper Plus" Warranty requires $100 deductible per visit after 12 months/12,000 miles.
†† Comparisons with other makes based upon available competitive data.

mazda

Circle No. 130 on Reader Inquiry Card

SOD *from page 62*

Maintaining sharp mowers is also important in developing shear strength. It has been demonstrated that dull mowers significantly reduce turf quality, increase leaf spot disease activity and increase gasoline consumption by 22 percent.

Obviously maximum light absorption is desireable. This generally will maximize food production if temperatures are not excessive. Shaded turf tends to have thinner cell walls and be more prone to traffic injury. Excessive use of non-ventilated rain tarps can lead to inefficient use of stored food reserves in respiration. Therefore, quick removal of rain tarps is important to maintaining good shear strength.

Hormones affect roots

Preliminary research at Virginia Tech by J.M. Geatley and R.R. Schmidt, discussed in the Virginia Tech Field Day Reports in 1987 and 1988, has demonstrated substantial root and shoot stimulation of turfgrass using seaweed extractable cytokinios and "cytokinin-like" fungicides.

It is known that hormones do control root and shoot growth and once the mechanics of how to utilize hormones with maximum efficiency is worked out, it is possible that increased shear strength will result.

Their research has demonstrated increased shear strength on Kentucky bluegrass sod utilizing "cytokinin-like" fungicides such as propicanarable and triadimefor.

Compaction will reduce shear strength by its negative effect on root growth and turf quality. A management program that includes aggressive aerification coupled with good traffic control, irrigation management and turfgrass selection can help minimize this negative impact. Capital improvements that provide efficient irrigation design, modification of soils to resist compaction and installation of drainage will all help to reduce this negative impact of compaction.

Phosphorus and nitrogen appear to be the most influential nutrional elements on root production. Of the two, nitrogen is most often mismanaged.

Aerification desired

Coring aerification increases air exchange, water infiltration, water retention, nutrient penetration and thatch decomposition while decreasing surface water runoff and irrigation frequency. It is a management practice that is absolutely essential to the quality production of turf on an athletic field.

Herbicides have the potential to harm turfgrass if improperly used. Most broadleaf herbicides, when applied in accordance with label recommendations, do little damage to turfgrass root systems. However, some preemergence and postemergence annual grass control herbicides do have the potential to reduce root system development even when used at recommended rates. Therefore, it is wise for athletic field managers and sod producers to critically scrutinize the data with regard to the potential of their preemergence herbicide to cause root pruning.

Work on cool-season grasses suggest that bensulide, pendimethalin and prodiamine have the potential to root prune Kentucky bluegrass and reduce shear strength. Likewise, bensulide and metribuzin do have potential to reduce bermudagrass root development.

Pest control

Timely and effective control of diseases, insects and nematicides is obviously important as these pests have tremendous potential to reduce turf quality, root growth and turf shear strength.

In summary, utilize low to moderate levels of nitrogen and adequate levels of supplemental nutrition. Select the varieties that have the greatest potential for providing the best combination of mowing height and frequency that removes no more than 1/3 of the existing green tissue. Remember that low mowing heights and intense mowing frequency reduce root and rhizome development in Kentucky bluegrass.

Minimize the negative effects of compaction through implementation of an aggressive aerification program.

Carefully select preemergence herbicides to minimize the potential for root pruning. Maximize pest control effectiveness by applying the most efficacious materials at the proper time and in accordance with label directions. **LM**

Some People Would Like to Snuff Out Oregon's Grass Seed Industry.

Turfgrass professionals have come to know Oregon grown grass seed as the finest in the world. Now, some legislators here would like to put a stop to field burning ... the way we sanitize our fields of turf diseases and pests. This could mean the end of our grass seed industry as we know it, or at least, higher prices in the marketplace.

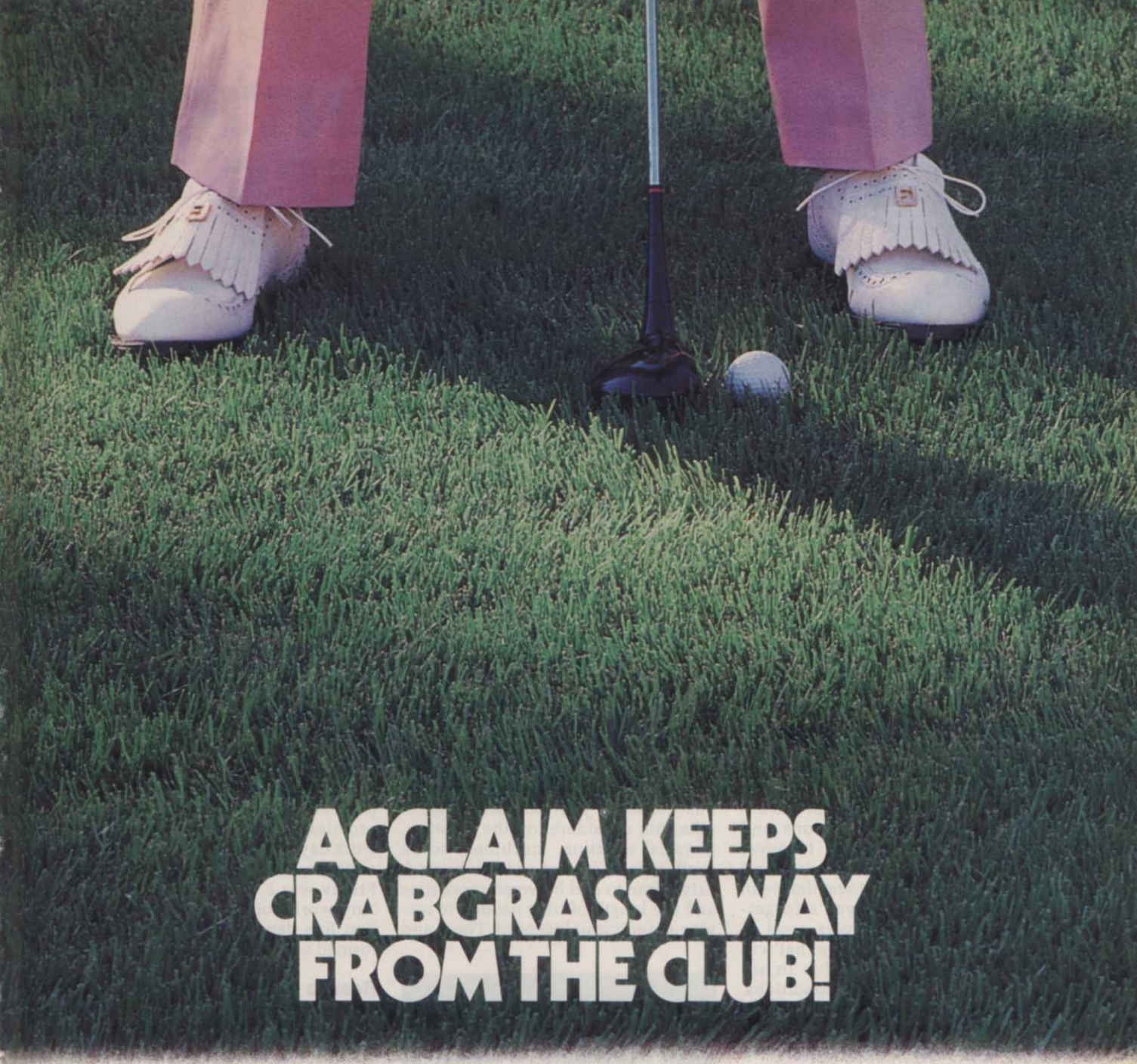
We need the help of turfgrass professionals. We need to tell our side of the story to legislators and the voting public. That's where you could help. Please help by sending some green *back* to Oregon.

Please make checks payable to

OREGON SEED COUNCIL

866 Lancaster Drive SE
Salem, Oregon 97301
503-585-1157

Circle No. 142 on Reader Inquiry Card



ACCLAIM KEEPS CRABGRASS AWAY FROM THE CLUB!

Safe, effective crabgrass control.
Here is what golf course superintendents need for crabgrass and goosegrass control. Here is Acclaim® 1EC Herbicide –an aggressive rescue treatment that is truly effective, yet easy on turf. Unlike the old arsenates, Acclaim is effective with just one treatment. And Acclaim won't harm seedlings when applied to new or reseeded turf.

Be ready for rescues anytime.
The best time for rescue treatments is early, beginning within 2 weeks of July 4th–but Acclaim controls emerged crabgrass up to 5 tillers and goosegrass up to 3 tillers anywhere, anytime.

So be ready to treat those high-use areas with Acclaim while crabgrass and other problem grasses are still small.

You'll stay on top of crabgrass–and get nothing but compliments on your lush, beautiful turf.

Read and follow label directions carefully.
Acclaim is a registered trademark of Hoechst Celanese Corporation.
The name and logo HOECHST are registered trademarks of Hoechst AG.
The name and logo ROUSSEL are registered trademarks of Roussel Uclaf S.A.

Hoechst
Roussel

ACCLAIM.®
Because your turf is always on display.

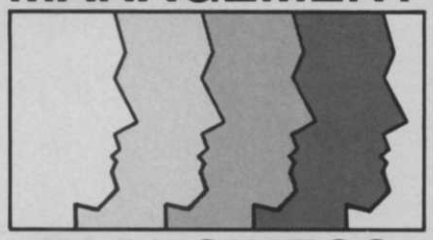
Circle No. 119 on Reader Inquiry Card

EMPLOYEE RETENTION IN TRYING TIMES

As employee pools dwindle, flexible work schedules might be a way to attract and keep good people.

by Ed Wandtke

MANAGEMENT



IN BUSINESS

The green industry in 1989 is experiencing an employee shortfall never before seen by any industry in the United States. Fewer available employees and an upcoming increase in the minimum wage will force you to pay even more for employees that are harder to find and keep.

How can you attract and retain employees in such times? One way is to maintain a reasonable work schedule.

Defining the job

How many hours do your employees expect to work when they sign on for the season? Do you tell them what impact the weather can have on their work days in the early part of the season?

Don't assume that because you explain the working conditions and hours during the interview, turnover will be reduced. Memories are short and long hours and hot weather tend to increase an employee's forgetfulness. Prudent managers need to implement a work schedule that will reduce employee stress due to adverse work and weather conditions.

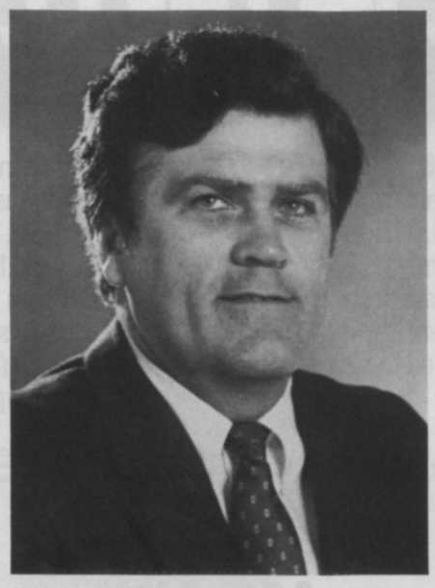
Some companies currently schedule production to consume more than 10 hours per day, five days a week and one-half day on Saturday. Other companies set production based not on hours but on the number of accounts that need to be produced each day of the week to be certain that all customers are serviced during a round, or weather-related period of time.

Mowing and maintenance firms often book too much work for a given day of the week. Therefore, to encourage their employees to perform this higher workload, they pay their employees on a percentage of production basis.

What's a reasonable workload?

All of these scheduling systems completely ignore the implications of weather conditions on employees' morale and the impact extended hours has on production over a prolonged period of time. What can be done to alleviate this heavy-handed production push condition?

Determining a reasonable workload for employees performing various duties in your company should take into consideration the weather, physical exertion, machinery to be used, type of service to be delivered, drive time to and between properties and the length of time needed to service an individual account. These and other variables need to be determined for each route that you operate in your company (compare the actual time to your estimate to determine if your estimates are loose or tight).



Ed Wantke is a senior consultant with All-Green Management Associates in Columbus, Ohio. He focuses on operations and financial questions.

Four or five day week

Many green industry companies discovered that when they scheduled work for five days of the week, they frequently were working all day Saturday and Sunday to complete scheduled tasks. Equipment breakdowns, absenteeism and weather constantly caused them to work these extra days. The result was more absenteeism the following week or less than quality work. Working out a solution to this dilema was an immediate necessity.

A solution that appealed to the employees and management was a compromise in the length and number of work days. Hours were increased to 10 or 11 for Monday through Thursday. Friday was a day to finish by 5 p.m. Any work not completed during the first five days of the week was performed on Saturday.

Results of a shorter week

Cutting the scheduled work week to five days resulted in almost all of the crews completing their work by Friday in order to have Saturday and Sunday off. All of these time improvement features were accomplished with the employees personal needs in mind and with no reduction in pay. Morale continued to increase and employees have remained with the company for more than three years even though they are not yet full-time workers.

A potentially undesireable result of this plan is that, if you're asked to bid a Saturday service, you'll have to either double the price or turn the account down.

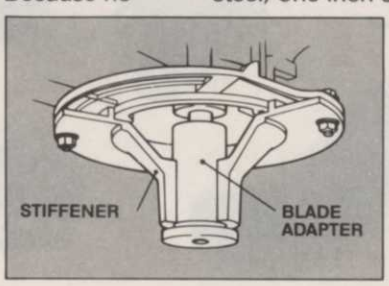
Knowing when and how to lighten the workload requires planning. Morale, employee retention and company profitability will increase if the owner pays more attention to the hours employees work. **LM**

We stake our reputation on it.

We're so sure our revolutionary new walk-behind 2-cycle crankshaft system will stand up to what you run into, that we're backing it with an exclusive two-year warranty.

No one else in the industry offers a two-year crankshaft warranty on small trimming mowers. Because no one else has what Jacobsen has. A revolutionary (patent applied for) crankshaft protection device incorporating an adapter and stiffener that help prevent twisting, bending or breakage. Thus, effectively extending engine and equipment life, while maximizing productive cutting time.

In fact, extensive testing showed this unique Jacobsen design to be vastly superior to anything in the market. At full throttle, a solid steel, one-inch shaft was placed in the path of the rotary blade. Competitive crankshafts bent on contact, yet the Jacobsen crankshaft survived. Not once, but again and again, without damage.



Combine the exclusive new Jacobsen crankshaft system with our durable 2-cycle engine, rugged lightweight aluminum magnesium alloy deck, heavy-duty greasable wheels, large five-quart fuel tank and shock-absorbing front bumper and you've got the most reliable commercial walk-behind available. We guarantee it.

So see your nearest Jacobsen Commercial Products dealer for more information and a free demonstration of the industry's most durable walk-behind rotary mower.

Jacobsen Division of Textron Inc., Racine, WI 53403.

J-1-7

JACOBSEN
TEXTRON
Jacobsen Division of Textron Inc.

Circle No. 121 on Reader Inquiry Card

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PRODUCTS

Operator controls lend added safety

Exmark Manufacturing Company has added Operator Presence Controls (OPC) to its full line of commercial power mowers. The company says the controls provide precise fingertip control for safe and easy operation.

When OPC levers are released, the mower engine stops automatically if either the blade or wheel drive are engaged. Easy grip OPC levers are on the mower handles, increasing effectiveness and reducing operator fatigue.

Circle No. 191 on Reader Inquiry Card

Five-hp engine guns into market

Tecumseh Products Co. of Grafton, Wisc. has introduced the five-hp OVRM50 engine. Sources at Tecumseh say the engine provides a 25 percent increase in horsepower.

Both the OVRM40 and OVRM50 are equipped with an automotive-type paper air filter, two-quart, no-rust fuel tank with large fill opening, easy access oil fill and dip stick and long-lasting muffler.

Circle No. 192 on Reader Inquiry Card

Equipment injects turf with polymers

Rainsaver, Inc. manufactures equipment useful for placement of starch-based polymers at the turf root level. According to Rainsaver, these water-absorbent polymers reduce water use by about 50 percent.

The Rainsaver equipment slices the turf every three to six inches, and then injects liquid polymers to a depth of 2 to 2½ inches into the root zone. The polymers hold up to 250 times their weight in water.

Rainsaver says the equipment is well suited for subsurface application of pesticides for grub and mole cricket control.

The Rainsaver 360 is designed for lawn care and industrial park areas. The Rainsaver 960 is designed for larger areas and can cover 12 to 20 acres a day with its 7½ inch swath.

Circle No. 193 on Reader Inquiry Card

Flow sensors measure for all services

Data Industrial of Pocasset, Mass. now offers a new line of 4000 Series flow sensors. The sensors' in-line, flow-through design uses a tangential six-bladed impeller for liquid flow measurement. The sensors are offered in nominal ½", ¾" and 1" pipe sizes, and are molded of PVC, CPVC and PVDF materials for all services, including deionized water and corrosive fluids. Pressure ratings of 350 PSI @ 70° and temperature ratings of 220° at 98 PSI are available depending on material selection. The unit's non-magnetic detection circuit provides accuracy within 1% full scale.

EASY COME.

Top row: *Leaf-feeding caterpillar, Mealy bug, Japanese beetle, Bagworm, Gypsy moth.* Bottom row: *Cankerworm, Leaf skeletonizer, Tent caterpillar, Webworm.*

The 4000 Series units are compatible with a full range of Data Industrial transmitters and displays.

Circle No. 194 on Reader Inquiry Card

Biostimulant has had good results

ROOTS is a new root growth enhancer developed to promote root growth in turfgrass, trees and ornamental plants. ROOTS is composed of cold and warm water keip extracts, humic acids, plant enzyme catalysts and a metabolizing agent. It may be mixed in dilution with most fertilizers, pesticides and herbicides except calcium nitrate and calcium phosphate.

For best results, dilute one gallon in at least 50 gallons of water.

Circle No. 195 on Reader Inquiry Card

Three-in-one helmet for safe trimming

A tri-function helmet system developed by Stihl for logging and tree trimming professions features a patented front visor sealing. The visor keeps saw dust and debris from falling between the mesh screen and hard hat.

The lightweight system has a noise reduction rating of 22 decibels. Colored bright orange to promote the visibility and safety. Available with a patented rear rain shield.

Circle No. 196 on Reader Inquiry Card

Disc trencher in the groove

Dosko offers two models of disc trenchers, both with a maximum below grade cutting capacity of one foot.

The RC-14 is powered by an 18 hp/2800 RPM Kohler gasoline engine with electric start.

The smaller RC-12 is a 12 hp/2800 RPM gasoline model with recoil start.

Trench widths for both models are

NEW!

EASY GO.

The invasion is coming. An army of hungry insects, ready to destroy everything you've worked so hard to achieve.

But with new TEMPO® insecticide, they're stopped dead in their tracks. On arrival. With excellent residual control. And all while using about 60% less chemical than most of the competition.

It's really a simple idea. Ornamentals need protection when insects mount their attack. With new TEMPO, the battle is over before it's even started. No contest.

Mobay Corporation
A Bayer USA INC. COMPANY
Bayer MOBAY
Specialty Products Group
Box 4913, Kansas City, MO 64120

Tempo is a TM of Bayer AG, Germany. ©1989 Mobay Corp. 62891

Circle No. 135 on Reader Inquiry Card

two, three and four inches.
Circle No. 197 on Reader Inquiry Card

Custom control system monitors application

The CCS100 Custom Control System from Dickey-John automatically

maintains a preselected application rate for herbicides, insecticides, fungicides and liquid fertilizers, even as ground speed varies.

The system features a quick-acting, stainless steel control valve and sealed components for reliability and weather resistance. Digital readout displays pressure and gallons per acre or gallons per 1000 sq. ft. The unit also contains an audible alarm system to warn of inaccurate application.

Circle No. 198 on Reader Inquiry Card

Control chemical drift with new spray tip

The XR TeeJet from Spraying Systems Co. may help turf applicators reduce the risk of chemical drift and eliminate weeds entrenched in rough terrain.

The patented extended-range spray tip is designed to maintain a consistent pattern over a wider range of spraying pressures. With the extended-range tip, applicators can adjust droplet size and flow rate without stripping down booms. To control drift, adjust the XR TeeJet to as low as 15 PSI (60 PSI maximum for broadcast spraying). Spray angles range from 80 to 110 degrees.

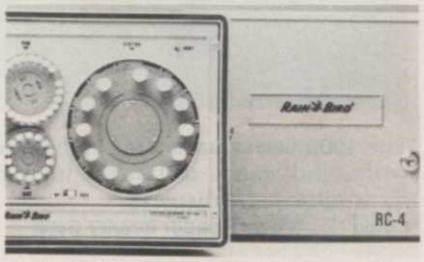
Circle No. 199 on Reader Inquiry Card

Conserve smarter with RC controllers

Rainbird has updated its line of RC Series electro-mechanical controllers. The RC-4C, RC-7C and RC-1260C now feature a terminal strip for convenient installation of field wiring to valves and a quick-disconnect plug for easy connection of the controller panel.

The RC Series is available in four, seven or 12-station models. A master power switch permits system shutdown during rain and retains the program during system maintenance.

Available with station timing of three or six minutes to one hour per station. Program up to one to 23 automatic starts per day.



Circle No. 200 on Reader Inquiry Card

Backhoe equipped for greater depth

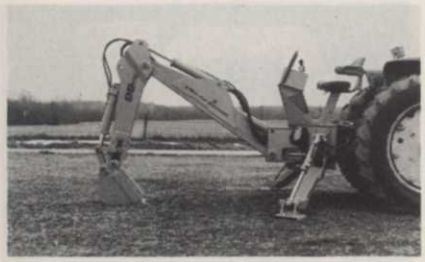
New Age Equipment, Inc. of Lafayette, Ind. has released its Moddel 99 high performance backhoe for skid steer and 3-point hitch applications.

An extendable dipperstick in-

MITE.

creases depth and reach by two feet over the standard nine-foot model. The backhow features 2" diameter chrome moly pivot pins that run on steel backed bronze/polymer replaceable wear bushings of 100-hour lubrication intervals.

Other options include: externally capped hydraulic cylinders with replaceable hardened steel wear bushings; SAE 100 R-2 hydraulic hose; o-ring ports; high strength alloy steel tapered section bucket.



Circle No. 201 on Reader Inquiry Card

Watering tube also keeps out weeds

The Growth Ring Watering Tube can be used to fertigate young trees and plants while at the same time keeping weeds out of tree basins.

The Growth Ring, says Caleb Industries, which manufactures it, "gives your plants the kind of irrigation that they like best—one that is not too wet to choke off oxygen from the roots and not so spasmodic as to put them in stress when you wait too long to water."

The ring, after being filled, can be covered with a light layer of mulch or soil to discourage vandalism.

Circle No. 202 on Reader Inquiry Card

Computer system meant for the little guys

A personal computer system designed for smaller companies is new from Thornton Computer Management Systems. The IBM compatible Altos 500 system is configured specifically for companies with 1 to 3 person offices.

The system contains 2 megabytes of memory and a 40-megabyte hard disk, one monitor that can expand up to three, and a 24-pin dot matrix printer with letter quality.

Prices start at $15,890, including hardware and SLICE Green Industry software, telephone support and classroom instruction.

Circle No. 203 on Reader Inquiry Card

Handle the rough stuff with Brouwer forklifts

New Brouwer rough terrain forklifts feature 5000-8000 lbs. capacities and 12-21 ft. masts.

The lifts are described as compact, light and rugged with tight turning radius for exceptional maneuverability.

Shuttle/torque converter features "on-the-move" shifting.

Circle No. 205 on Reader Inquiry Card

Flowable Morestan gets EPA go ahead

The Environmental Protection Agency has accepted for registration Mobay Corporation's new flowable formulation of Morestan 4 ornamental miticide, registered for use on flowers, shrubs and trees, and is free of harmful solvents.

Mobay sources add that the smaller particle size in the flowable product allows for more thorough distribution on the leaf surface, thus of-

NEW LIQUID FORMULATION!

MIGHTIER.

In the battle for healthy ornamentals, only the strong emerge victorious. And the weak fall by the wayside.

Introducing new flowable MORESTAN® 4 Ornamental Miticide.

With MORESTAN, you get the strength you need to defeat even the worst mite infestations, the type of infestation that can devastate an entire ornamental crop. Superior performance in a water-based liquid formulation, free of solvents that can cause phytotoxicity. With proven knock-down power, strong ovicidal activity and excellent residual control.

MORESTAN. For the power to control the mightiest of mite problems.

Mobay Corporation
A Bayer USA INC. COMPANY
Bayer MOBAY
Specialty Products Group
Box 4913, Kansas City, MO 64120

Morestan is a Reg. TM of Bayer AG, Germany. ©1989 Mobay Corp. 67431

Circle No. 132 on Reader Inquiry Card

fering better coverage and better control. Visible residue is eliminated on practically all leaf surfaces.

Morestan 4 is available in quart sizes with "Caution" label. Not available in California.

Circle No. 206 on Reader Inquiry Card

Seed Company expands growing supplies line

Ball Seed Company has expanded its complete line of growing supplies to include the full range of high-quality Envy soluble powder fertilizers.

Envy fertilizers are made from the highest grade raw materials, and are uniformly consistent for quick, even absorption by plants. A soluble wetting agent assures reduced watering and faster, more uniform distribution of the nutrients.

The eight formulations include two general purpose blends, 20-20-20 and 20-10-20; 13-16-32 poinsettia finisher; 16-2-16 lily special; 20-2-20 low phosphorus blend; 15-16-17 peatlite special; 20-5-30 potash special and 24-8-16 for tropical foliage.

Circle No. 207 on Reader Inquiry Card

Natural herbicide controls moss, algae

Moss & Algae Eraser from Lesco, Inc. provides selective control in turfgrass and other areas.

A quick-acting, natural fatty acid herbicide, the product is registered for use on all turfgrasses.

It also works on roofs, sidewalks,

decks, trees, growing containers and other surfaces.

The liquid concentrate can be applied with any sprayer, and is packaged in 2-½ gallon containers.

Circle No. 208 on Reader Inquiry Card

Emitter delivers water where and when needed

The Iso-Flo pressure compensating

emitter is designed by Agrifim to deliver a constant amount of required water at pressures of 10 to 40 psi.

The emitter is made of polypropyl-

GENTLE GIANT

Big John Model 90AA. The biggest transplanter you can buy. Also the kindest to trees.

Big John forms an expert nurseryman's rootball. With plenty of firm, undisturbed soil around the roots. And it pampers trees in transit, so they live and thrive without setback.

Get more information on The Gentle Giant, and the entire Big John family, down to 32". **Call 1-800-643-8039** or in WI 414-679-0318.

BIG JOHN

The gentle giant

BIG JOHN TREE TRANSPLANTER SALES

Circle No. 103 on Reader Inquiry Card

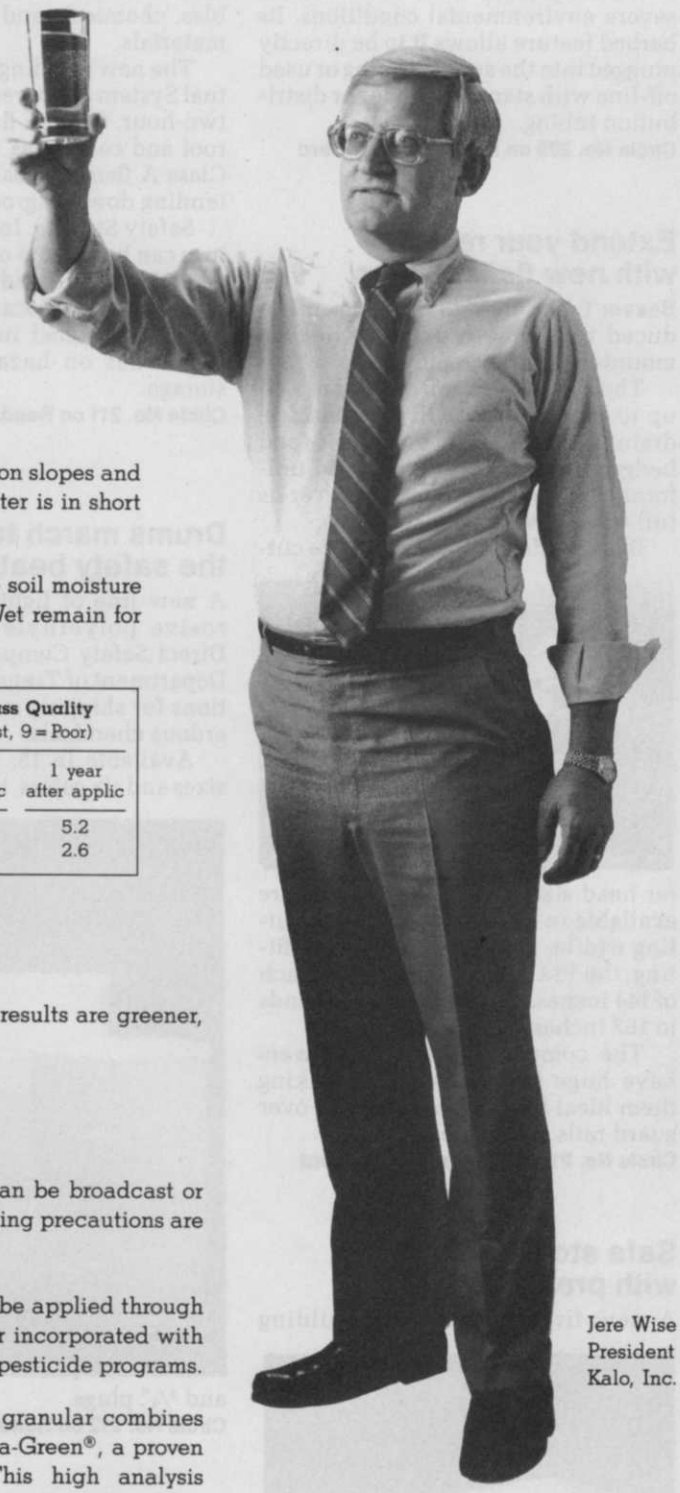
Water is a Precious Resource!

Hydro-Wet® Can Help Conserve Water. Maintain Quality Turf and Save Money Too!

Hydro-Wet Makes Water Wetter

Hydro-Wet reduces both the surface tension and cohesive tension of water. It helps water move rapidly through thatch and soil into the root zone providing uniform wetting of soil.

Because Hydro-Wet reduces water loss from run-off and evaporation, watering can be reduced 30% to 50%.



Jere Wise
President
Kalo, Inc.

Hydro-Wet Boosts Soil Moisture

With Hydro-Wet you increase the soil moisture reserve even on slopes and compacted soils. And that's especially important when water is in short supply.

University trials show Hydro-Wet can significantly increase soil moisture and improve turf quality. The beneficial effects of Hydro-Wet remain for months.

	Soil Moisture (%)	
Treatment	1 month after applic	1 year after applic
Check	5.3%	5.4%
Hydro-Wet	8.3%	8.4%
Increased soil moisture	56%	55%

	Turfgrass Quality (1 = Best, 9 = Poor)	
Treatment	2 months after applic	1 year after applic
Check	4.6	5.2
Hydro-Wet	1.6	2.6

Increased Soil Moisture Improves Turf Quality

A higher soil moisture content reduces drought stress. The results are greener, lusher turf. And noticeable dry spots are eliminated.

Hydro-Wet Available As Liquid Or New Granular

Both the liquid concentrate and easy-to-spread granular can be broadcast or applied as a spot treatment. No special equipment or handling precautions are necessary.

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Circle No. 122 on Reader Inquiry Card

ene, and Agrifim says it can withstand severe environmental conditions. Its barbed feature allows it to be directly plugged into the supply tubing or used off-line with standard feeder or distribution tubing.

Circle No. 209 on Reader Inquiry Card

Extend your reach with new flail mowers

Beaver Equipment Limited has introduced two new three-point linkage mounted flail reach mowers.

The P12 and P15 can cut and mulch up to two years growth in roadsides, drainage ditches, field boundaries and hedges. Cuttings are discharged uniformly behind the cutter head over its full cutting width.

Beaver offers a choice of three cut-

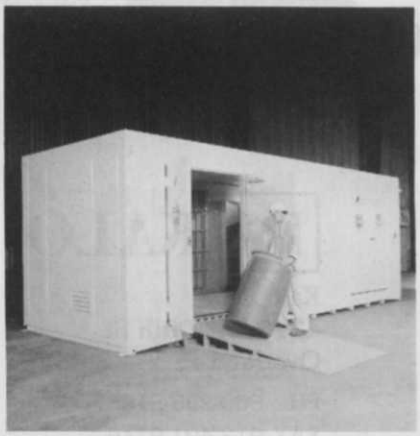
ter head sizes. Flail cutter heads are available in 40-, 48-, and 60-inch cutting widths. With the cutter head fitting, the P12 offers a horizontal reach of 144 inches. The P15's reach extends to 187 inches.

The company says both mowers have huge fence clearance, making them ideal for highway mowing over guard rails and fences.

Circle No. 210 on Reader Inquiry Card

Safe storage easy with prefab building

A new fire-rated storage building



from Safety Storage, Inc. is designed to provide a prefabricated, relocatable structure for safe storage of flammables, chemicals and other hazardous materials.

The new buildings are Factory Mutual System approved and incorporate two-hour, Class A flame spread rated roof and ceiling, as well as two-hour Class A flame spread rated walls extending down to ground level.

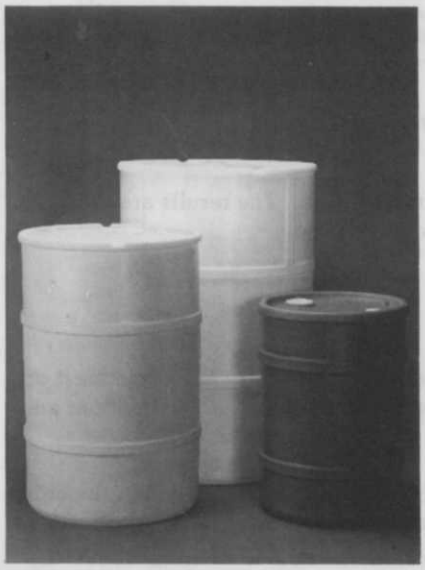
Safety Storage, Inc. says the buildings can be located on any flat surface adjacent to or inside existing buildings, subject to local regulations and conditions stated in Factory Mutual guidelines on hazardous materials storage.

Circle No. 211 on Reader Inquiry Card

Drums march to the safety beat

A new line of lightweight, non-corrosive polyethylene drums from Direct Safety Company comply with Department of Transportation regulations for shipping and storage of hazardous chemicals.

Available in 15; 30-and 55-gallon sizes and six colors, the drums have 2″



and ¾″ plugs.

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Repair fitting is convenient, economical

Slip-Fix, an in-line PVC repair fitting from AMS Plastics is designed for quick and easy installation of valves, repair of broken water lines and the addition of laterals and risers.

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Slip-Fix is available in ½ to 4-inch sizes, with a 1500 PSI rated O-ring and pressure ratings to Schedule 40 tolerances. A patented O-ring relief helps maintain the O-ring's shape and mobility, ensuring leakproof operation.

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One-piece fitting for easy assembly

A new Unitized Swing Joint from Lasco Fittings is a one-piece molded swing arm with no welded joints. The

standard 12-inch lay length can be increased by adding a top-out nipple. A choice of inlets is provided to fit the system and various outlets may be specified to fit sprinkler heads.

The new swing joint is available in 1″, 11/4″ and 1½″ diameters, all pressure rated at 200 PSI/73° Fahrenheit. It features leak-proof O-rings seated in sealing grooves free of parting lines.

The Unitized Swing Joint carries a three-year performance warranty.

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Pellets spot treat the dry turf areas

Aquatrols has reformulated its Aqua-Gro soil wetting agent into pellets. The Advantage Pellets are applied through a hose-end unit, for treatment of localized dry spots. Aquatrols predicts turf managers will receive about twice the active ingredient of competitive pellets at a lower cost per

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The Advantage Applicator features a hose quick couple and comes complete with fittings for a one inch hose and an adapter for a ¾ inch hose.

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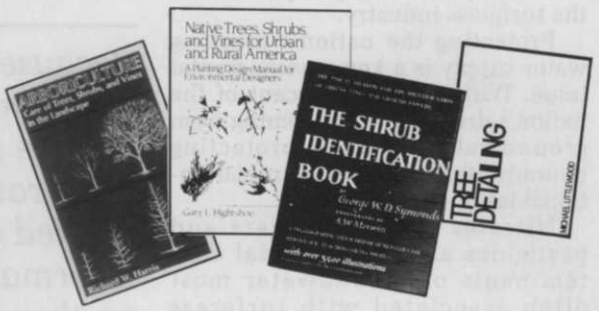
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Studies to protect groundwater quality

by Martin A. Petrovic, Ph.D., Cornell University

The national concern over chemicals in the environment has seldom been higher.

The recent episodes of Alar in apples and cyanide in grapes are cases in point. A segment of chemical users receiving even more pressure are non-food-producing groups such as the turfgrass industry.

Protecting the nation's drinking water supply is a key environmental issue. With about 50 percent of the nation's drinking water coming from groundwater supplies, protecting groundwater quality is a crucial national issue.

Nitrates from fertilizers and pesticides are two potential contaminants of groundwater most often associated with turfgrass culture.

The nitrogen question

In the past decade a wealth of knowledge has been generated on the fate of nitrogen applied to turfgrass. Considerable information exists on nitrate leaching from sandy sites, but little or none exists from finer textured soils. A study was initiated for this purpose in 1987 at the Cornell University Long Island Horticultural Research Station, Riverhead, N.Y.

The study, supported by member companies of The Fertilizer Institute, evaluated the leaching potential of 9 different nitrogen sources (ureaform, methylene urea, two sulfur-coated ureas, urea, calcium nitrate, two polymer-coated ureas and Milorganite) applied as a "typical lawn" program.

Preliminary results indicate that the amount of fertilizer nitrogen leaching past the rootzone ranged from 0 to 5 percent, with most at 1 percent or less.

The amount of fertilizer nitrogen removed in the clippings of Kentucky bluegrass was found to range between 3 and 21 percent of fertilizer applied.

This study will continue until the spring of 1990 and provide additional information needed to develop a model to describe the fate of nitrogen applied to turfgrass.

Options available

The options available to manage nitrate leaching are: nitrogen source selection and rate of application, season of application, irrigation management and possibly amendments of sandy soil.

Amending sand for putting green or high-use athletic field construction may prove to be a valuable means of reducing nitrate leaching. Sand, by nature, does not absorb nutrients (low cation exchange capacity), especially the inorganic forms of nitrogen (ammonium and nitrate) as well as potassium.

Because leaching data is not needed in order to receive pesticide registration, there is a limited amount of information available on the subject.

Most sources of nitrogen fertilizers generally go through a conversion from ammonium to nitrate (nutrification). Ammonium, being a cation (+ charge), is held in soils having a high cation exchange capacity (not sand). Nitrate, on the other hand, is an anion (− charge) and is not held in soil, so it is easily leached if water is passing through the soil.

The ideal amendment would stop nitrogen from leaching, but still allow the green to have the physical properties of good drainage and aeration, and to resist compaction.

Clay has good cation holding properties but would destroy the physical properties of the green.

Natural zeolite

One material potentially meets both criteria—natural zeolite. One natural zeolite, called clinoptilolite, is a secondary mineral with a high silica content formed from volcanic rock. Major deposits of clinoptilolite are found in the western U.S.

Clinoptilolite can be crushed and screened to sand-sized particles with good physical properties and a cation exchange capacity like clay. Initial studies have shown that the physical properties of sand mixtures containing 5 percent clinoptilolite are maintained at the same time that the clinoptilolite protects the ammonium from being converted to nitrate.

Large scale field testing is now under way to determine to what extent clinoptilolite-amended sand will resist nitrate leaching. Organic amendments will also be evaluated.

There is limited information on the leaching potential of pesticides applied to turfgrass. Generally, this is a result of the fact that even though leaching data is needed for pesticide registration, little has been done related to turfgrass. Furthermore, the information available on pesticide leaching may not be applicable for the turfgrass ecosystem for the following reasons:

- The turfgrass sward has a very high surface canopy compared to row crops. This could relate to greater interception of the pesticide, resulting in the potential for more plant uptake, photodegradation and volatilization.
- The turfgrass ecosystem often has a thatch layer associated with it. The thatch can absorb some of the pesticide and provide conditions that favor both more volatilization and enhanced microbial degradation.
- Under turfgrass conditions, the surface soil contains substantially more roots than most other cropping systems. This could relate to more root uptake or other aspects that could tie up more pesticide.

Establishing models

Numerous pesticide leaching models can predict the leaching potential of a given pesticide. Work being done this year at Cornell University will examine the usefulness of four pesticide leaching models in predicting the leaching from turf of at least two pesticides (Sevin and Daconil 2787).

The study at the A.R.E.S.T.S. facility will involve three soil types (sandy, sandy loam and slit loam) and two irrigation approaches (light, frequent versus heavy, infrequent).

Protecting our nations resources, such as groundwater, should be a concern of every landscape manager. Research of this nature can provide the information necessary to protect the environment while allowing turfgrasses to have the quality desired. **LM**

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Circle No. 147 on Reader Inquiry Card

Blending talents is his key to success

Lebo Newman, vice president of Redwood Landscaping, Santa Rosa, Calif., has achieved success by using his talents fully. He studied architecture in college, showing an aptitude for perceiving spacial relations. And, since moving to California, he has combined this talent with a love for growing things.

Lebo Newman, vice president of Redwood Landscaping, Santa Rosa, Calif., believes landscapers should take advantage of industry organizations.

Newman's company, Redwood Landscaping, is the largest landscape contractor in California's Sonoma County, specializing in installation and maintenence work. The firm maintains 250 acres of properties in Sonoma, Marin, Napa and Solano counties, including commercial, industrial, public and multi-residential sites.

The focus was on installation when Newman became a partner with Bill Davidson in Redwood Landscaping in 1973. "We soon noticed the landscapes installed were not maturing as they should have due to the lack of professional landscape care available in our area," Newman recalls. "This prompted us to offer professional landscape maintenance services, too."

Bigger and better

Professionalism is the key to effective landscape management, Newman believes. "We provide far more than just a mowing crew," he says. "Recognizing and solving problems that cause damage over a long period of time requires an understanding of the design intention, irrigation and planting, drainage standards, horticultural techniques and the particular needs of the client."

That's why Redwood Landscaping employs specialists in the fields of turf management, pesticide use and safety, irrigation repair and horticulture. "Each technician completes training sessions in general horticulture techniques as well as the field they choose to specialize in," Newman says.

'It was one of the worst-case scenarios. But because of our previous timely irrigations and deep root feeding management, the grounds were able to survive the stress.'

—Lebo Newman

Safe weed control

For Newman, quality service also means sharing his community's concern for the environment. "Public sensitivity to chemicals is very intense in Marin County and Sonoma County is becoming more aware as well," Newman explains. "I like Turflon herbicide for both broadcast and spot applications because it's an environmentally responsible, cost-effective material."

"Turflon controls tough weeds. It doesn't require reapplications, either," Newman says. "That reduces the number of callbacks for us."

Newman's commitment to excellence was put the test in 1987 when 3,500 gallons of diesel fuel overflowed from an underground storage tank system onto property owned by Hewlett Packard, one of Redwood Landscaping's clients. The company's irrigation program had to be shut down or severely restricted for nearly a month while the spill was cleaned up.

The accident occured just before the California Landscape Contractors Association was scheduled to judge the 75-acre site for the state's prestigious Ben Slade Memorial Award. Newman considered withdrawing from the competition, but finally decided to let the entry stand.

Award-winning job

"It was one of the worst-case scenarios that you never want to find yourself in," he says. "But because of our previous timely irrigations and deep root-feeding management, the grounds were able to survive the stress." And Redwood Landscaping received the award that year.

Redwood Landscaping has earned a cabinet-full of other awards in the CLCA's North Coast region since 1976 and statewide since 1986. The firm also has supplied three presidents and four officers of the CLCA in the past eight years.

Newman himself has been active in CLCA and other industry associations for 13 to 14 years. "One of my business philosophies is: support the industry, get out and work for it, and you'll learn from it," he says. **LM**

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ADVERTISER INDEX

NO.	ADVERTISER	PAGE NO.
101	American Cyanamid Co. (Regional)	91
102	Aquatrols Corp. of America	13
103	Big John Transplanter Sales	72
104	Brouwer Turf Equipment	51
105	Brouwer Turf Equipment/ Fork lift	12
106	Brouwer Turf Equipment/ Turf Roller	26
107	Ciba Geigy Corp./Pace	46-47
108	Ciba Geigy Corp./Subdue	20-21
109	Cushman Motors	43
110	Deere and Co., John	16-17
111	Dixon Industries, Inc.	39
112	Elanco Products Co./ Rubigan	41
113	Elanco Products Co./ Rubigan	41
114	Elanco Products Co./ Rubigan	53
115	Elanco Products Co./ Sonar	53
116	Encap Products Co.	18
117	Ford New Holland, Inc.	31
118	G.E. Mobile Communications	45
119	Hoechst Roussel Agri-Vet Co.	65
120	Hunter Industries	57
121	Jacobsen Div. of Textron	67
122	Kalo, Inc.	73
123	Kawasaki Motors Corp.	75
233	Kut Kwick Corp.	87
125	Lebanon Chemical Corp./ Dursban	18
126	Lebanon Chemical Corp./ Triumph	14
127	Lofts Seed, Inc.	CV4
290	Lombardini Inc.	37
130	Mazda Motor of America, Inc.	63
129	Melroe Co.	55
131	Mobay Corp./Bayleton	2-3
132	Mobay Corp./Morestan	70-71
133	Mobay Corp./Oftanol	49
134	Mobay Corp./Oftanol (Regional)	76-77
135	Mobay Corp./Tempo	68-69
136	National Mower	19
137	Nissan Motors Corp. U.S.A.	6-7
138	Nor Am Chemical Co./ Banol	15
139	Nor Am Chemical Co./ Proxol	CV3
140	Nor Am Chemical Co./ Turcam	61
141	Olathe Manufacturing, Inc.	40
261	Onan Corp.	23
142	Oregon Seed Council	64
143	PBI Gordon Corp.	24-25
144	Rhone Poulenc Ag Co./ Aliette	27
145	Rhone Poulenc Ag Co./ Chipco	32-33
146	Rhone Poulenc Ag. Co./ Sevin	89
147	Sandoz Crop Protection	81
148	Sierra Chemical Co.	59
149	Tecumsah Products Co.	30
150	Tee 2 Green Corp.	CV2
151	Turf Seed, Inc.	5
152	Turfco Manufacturing, Inc.	44
153	Woods Div. of Hesston Corp.	22
154	Woods Div. of Hesston Corp.	90

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Entry forms are now being accepted by the Professional Grounds Management Society and LANDSCAPE MANAGEMENT magazine for their third annual "Landscape Manager of the Year" award.

The purpose of the award is to recognize superior job performance among landscape managers, to challenge those involved in the industry, to achieve higher standards of excellence and to bring national recognition to deserving managers.

Any person directly responsible for the professional maintenance of one or more landscapes is eligible to enter. Applicants will be judged according to job performance, honors and awards, procedures and philosophies, and contributions to the green industry. Applicants will be asked, at the time of entry, to submit four 5 x 7 black-and-white glossy photos and 10 color 35mm slides of current work areas with a short narrative on each.

(clip and mail)

Applicant's name **Title**

Applicant's company

Official entry form should be sent to:

Name **Title**

Company

Address **City/State** **Zip Code**

Mail to: PGMS, Landscape Manager of the Year,1201 Galloway Ave.,Suite1E, Cockeysville, MD 21030, 301-667-1833

PROBLEM MANAGEMENT

by Balakrishna Rao, Ph.D.

Mites or mildew disease?

Problem: *Every year, we see whitish powdery growth on the lower surface of oak tree leaves. We also see a number of small black specks present in this area. Is this caused by mites? What can be sprayed to control this? (Ohio)*

Solution: From your description of the symptoms, the problem you are dealing with appears to be caused by a fungus called powdery mildew disease. The black structures you have been seeing are probably not mites, but are fruiting bodies of the fungus that contain fungal spores.

Several different powdery mildew fungi attack oak, including *Sphaerotheca lanestris*, the most troublesome mildew producer. Others are *Erisiphe trina*, *Microsphaeria alni* and *Phyllactinia corylea*.

It is possible that mites may also be present on the same plant. To detect mites, shake the leaves over some white paper or cloth. If mites are present, they will fall and begin to crawl on the white surface. Know that mites have eight legs while insects have six and that they leave a staining mark on the white surface when crushed. It's a good idea to verify this possibility just to be sure.

An application of fungicides like Acti-Done PM, Benlate or Karathane is recommended to manage the powdery mildew disease problem.

If the problem is identified to be due to mites, an application of horticultural oil during early spring or either Kelthane or Metasystox-R in mid-June and again two or three weeks later is recommended. Of course, read and follow label specifications for best results.

Identifying the disease

Problem: *How can I control disease and fungi in the adverse, mid-summer climate of south Florida, and how will this affect the turf? (Florida)*

Solution: Like with any pest management, success in disease management also depends on several factors, such as proper identification of the disease(s), proper timing for treating and using proper materials. Therefore, the first thing you should know is about the kind(s) of disease(s) you are dealing with. Your local cooperative extension service should be able to help you with that.

If the turfgrass areas have had a history of certain serious diseases in the past, treating these areas on a preventative basis (before the disease appears) may be beneficial. Most diseases can be effectively managed if the problem is detected very early in the disease development period and treated with proper fungicides. If the disease has progressed too far and is too late to manage, fungicide treatments may not be practical or beneficial. In some situations, overseeding or renovating the lawn may be necessary.

As far as your question as to how this will affect the turf—it depends on how well the overall disease management has been implemented. If the proper disease management program is followed, there is a good chance that a given disease can be effectively managed and the turf quality improved. The fungicides are designed to manage certain diseases and, if used properly, they can improve the health of the turfgrass.

The disease-causing agents establish on stressed and weakened plants. Therefore, along with fungicide treatments, it is important to identify the contributing stress factor(s) and provide corrective measures.

For most diseases, multiple applications of a fungicide is necessary at specific intervals. Refer to its label for further details.

When to seed and aerify

Problem: *We have seeded a number of lawns after aerifying and are not fully satisfied with the results. In many lawns, even after a full season's growth, bare areas are not filled in yet. In addition, we noticed a lot of clumps of plants in the aerification holes.*

What are we doing wrong? We would appreciate comments and guidelines for better seeding procedures. (New York)

Solution: Seeding the lawns after aerifying is one of the acceptable ways seeding can be done. This procedure works well if you are using turfgrass seed like Kentucky bluegrass with rhizomatous spreading habits. These plants with underground stems (rhizomes) can grow and spread and fill in bare areas. If you use turfgrass seeds primarily with bunch-type growth habits, they may fill in slowly or not at all. This would produce bunch-type growth surrounding aerification holes.

After aerifying, it is often a good idea to apply some fertilizer, particularly one high in phosphorus. Aerification aids in the movement of phosphorus through the root zone.

Another method of seeding is to use an aeroseeder. With this equipment you can expect better results because the machine slices the ground and drops the seeds into the groove, establishing seed and soil contact. **LM**

Balakrishna Rao is Manager of Technical Resources for the Davey Tree Co., Kent, Ohio.

Questions should be mailed to Problem Management, LANDSCAPE MANAGEMENT, 7500 Old Oak Boulevard, Cleveland, OH 44130. Please allow 2-3 months for an answer to appear in the magazine.

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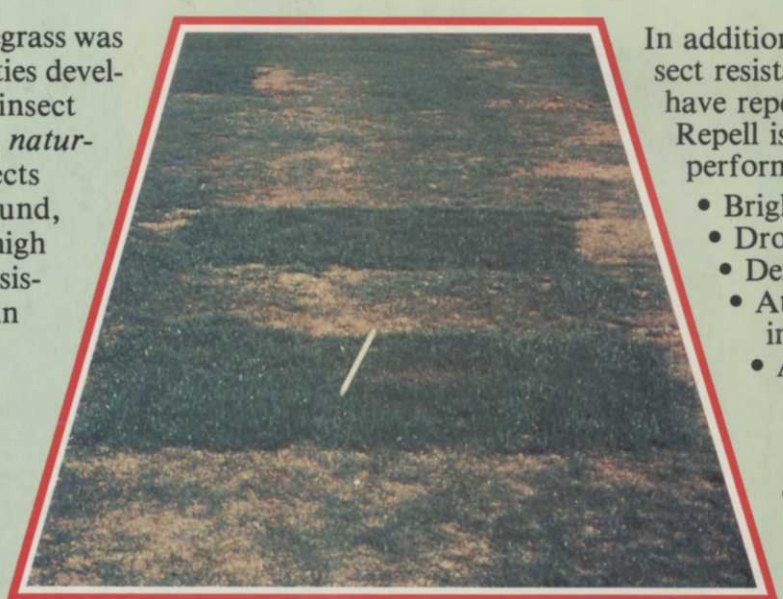

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